MINING CONGRESS JOURNAL

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PER TRIP

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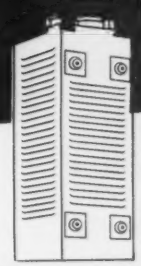

Look at mine haulage from the dollars and cents point of view. How much less does it cost to use the "Steel Mule" invented by Mr. Edison—the steel-alkaline battery? This battery is so entirely different that it costs less than any other on almost every score. How much would it save you?

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AT THE request of several mines, Bethlehem has added a No. 4 tie to this company's line of steel mine ties. No. 4 is strictly a heavy-duty tie for rough service under heavy motors, cutters, and loading machines. It is similar in section to No. 2 (2.50 lbs. per foot) and No. 3 (3.25 lbs. per foot), but weighs approximately 4 lbs. per foot. Section modulus shows it to be one-third stronger than the No. 3. No. 4 is $\frac{7}{8}$-in. high and 5-in. wide at the base.

No. 4 is not intended to replace either No. 2 or No. 3, but is in line with the growing preference for heavier, stiffer ties. It should last longer than either No. 2 or No. 3. It is less likely to bend. It gives better support to rails, and in at least one mine has been adopted to avoid the necessity of going to 40-pound rail. Some 50,000 No. 4 ties are already in use and are reported to be 100-per-cent satisfactory.

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BETHLEHEM STEEL COMPANY

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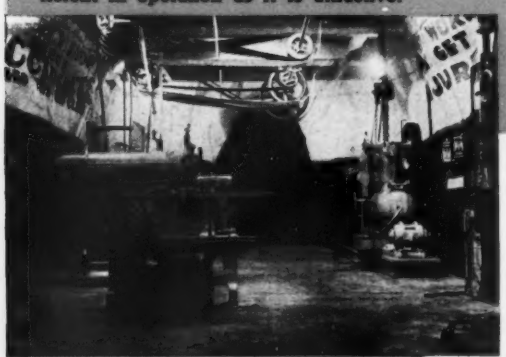
Well-groomed Willow Grove's new O-B-equipped outside haulage is just as efficient in operation as it is attractive.



Typical of Willow Grove's smooth running, modernized operation is this spick and span underground shop.

O-B Flexible Pole Brackets, Bulldog Clamps and Type N Curve Hangers maintain the wire at 20 m. p. h. efficiency.

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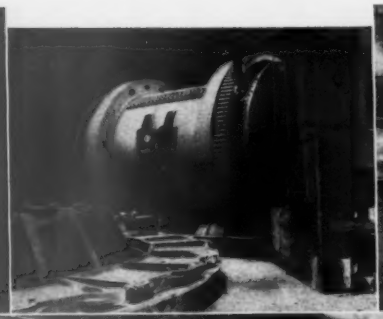

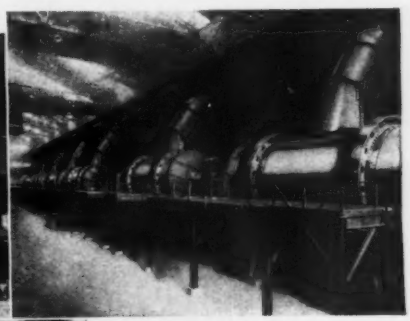

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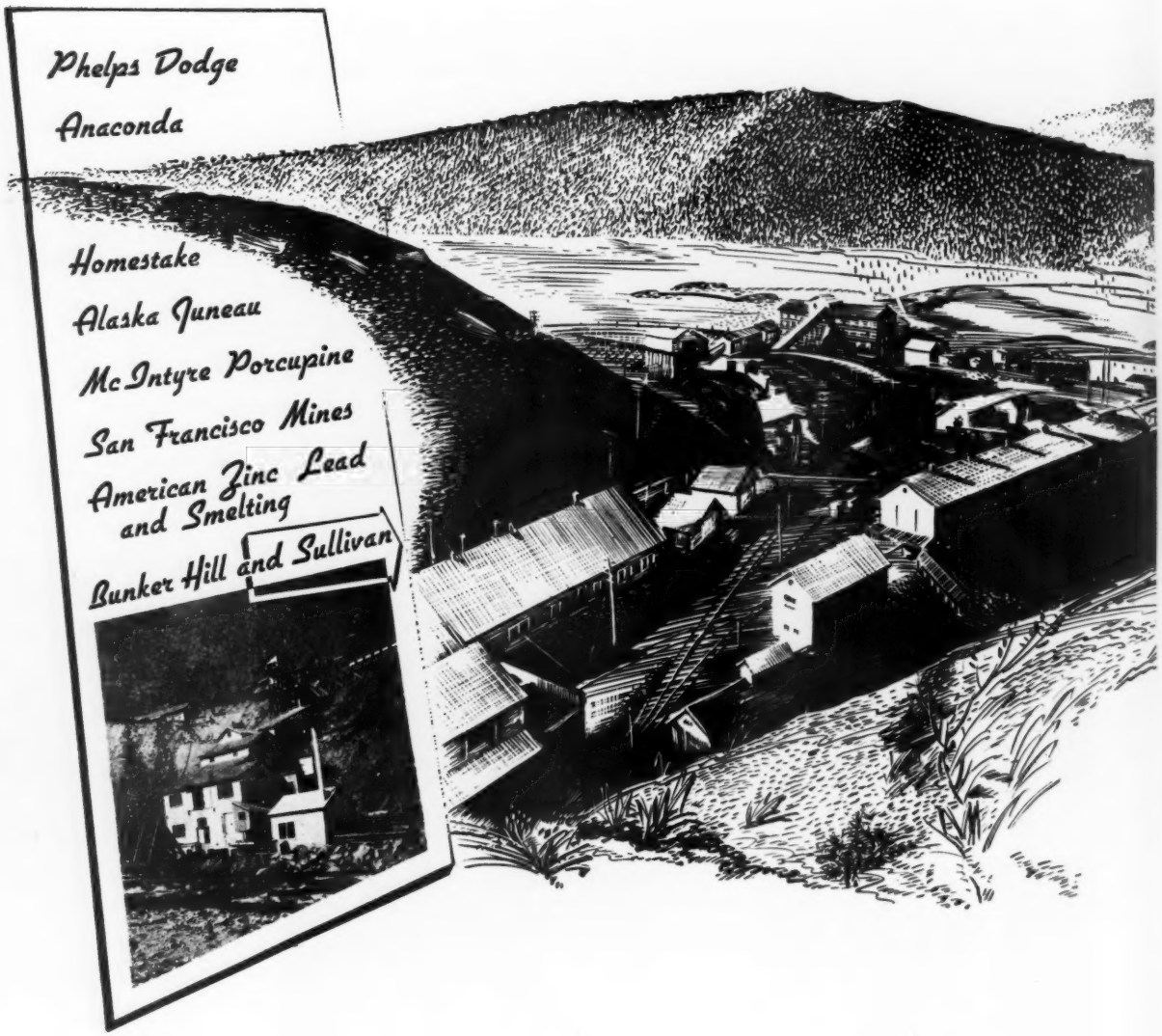

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Call the roll of outstanding individual mining properties featured by *Engineering and Mining Journal* and, with surprisingly few exceptions these properties have been — and still are — users of Cyanamid Reagents. No exception is BUNKER HILL AND SULLIVAN, consistent user of Cyanamid Reagents for all the years since "Feature Enterprise Numbers" were inaugurated in 1928.

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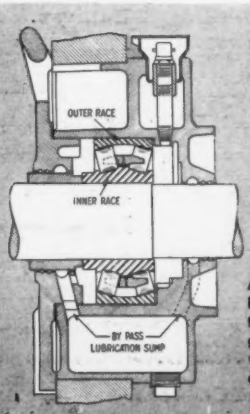
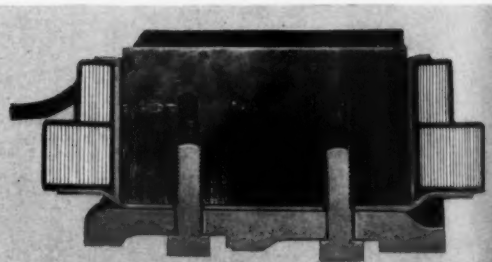
Ride the cab with Westinghouse—get the feel of Westinghouse controls—the ease and dependability of operation. At the Mining Congress—August 28 to 31. Exhibit space 308, 309, 316 and 317.

At left — Vertical type shovel motor, pioneered by Westinghouse, saves space, provides long-life durability of totally enclosed gearing.



At left—Shovel motor housings are dust-tight and arranged for grease lubrication, with by-passes to an excess lubricant sump.



Above—Cross section of motor field coil. Patented construction holds these coils tightly in place and eliminates spring washers and other loose parts. Coils impregnated with high grade insulating varnish, resistant to dust, moisture and oil.

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AT THE MINING CONGRESS

IF YOU'VE FORGOTTEN HOW IT FEELS TO SWING 'ROUND WITH THE SHOVEL, TRY IT AT SALT LAKE CITY!

We've built an exhibit for the Mining Congress at Salt Lake City, August 28 to 31, that we hope will entertain you — and give you some new ideas about Westinghouse power shovel equipment.

No, we haven't the space to let you operate the dipper, and actually do a bit of digging. But, you can climb into the cab, and operate the Master switches and swing — and see for yourself how smoothly they work. With every unit matched, built of sturdy, powerful parts . . . with a continuous flow of new developments to keep pace with modern shovel requirements . . . Westinghouse equipment will give you economical, dependable performance . . . will deliver more profits from your shovels.

And, if you are interested in moving more material at less cost, we suggest that you discuss details with the Westinghouse representative. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., or Westinghouse Electric International Company, 150 Broadway, New York, and principal cities of the world.

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P.S. If you can't attend the Congress, ask your local Westinghouse office for the special booklet — "Electrical Equipment for Power Shovels" (B-2133), which shows you the latest developments in electric shovel equipment.

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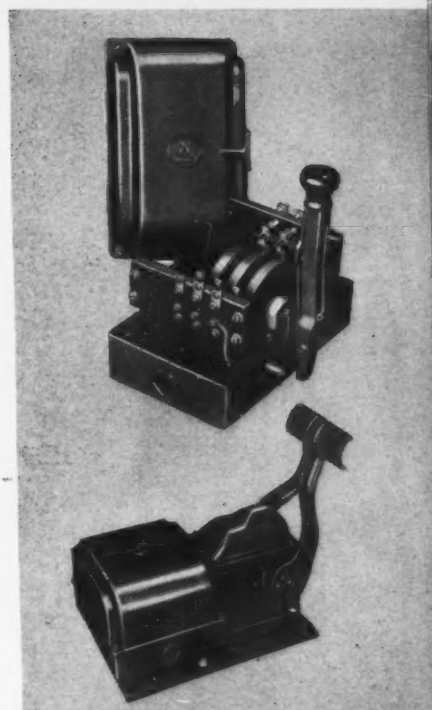

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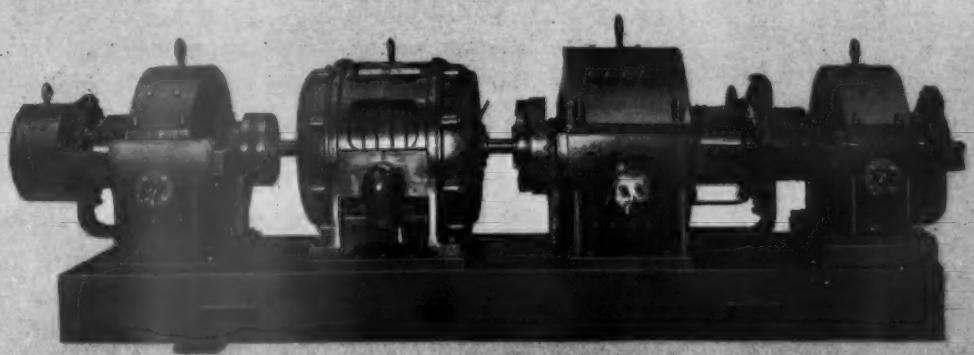

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Increased hole production is only one of the important advantages you are passing up by not using TIMKEN Rock Bits. In addition there are large savings resulting from the elimination of forging and the reduction of nipping.

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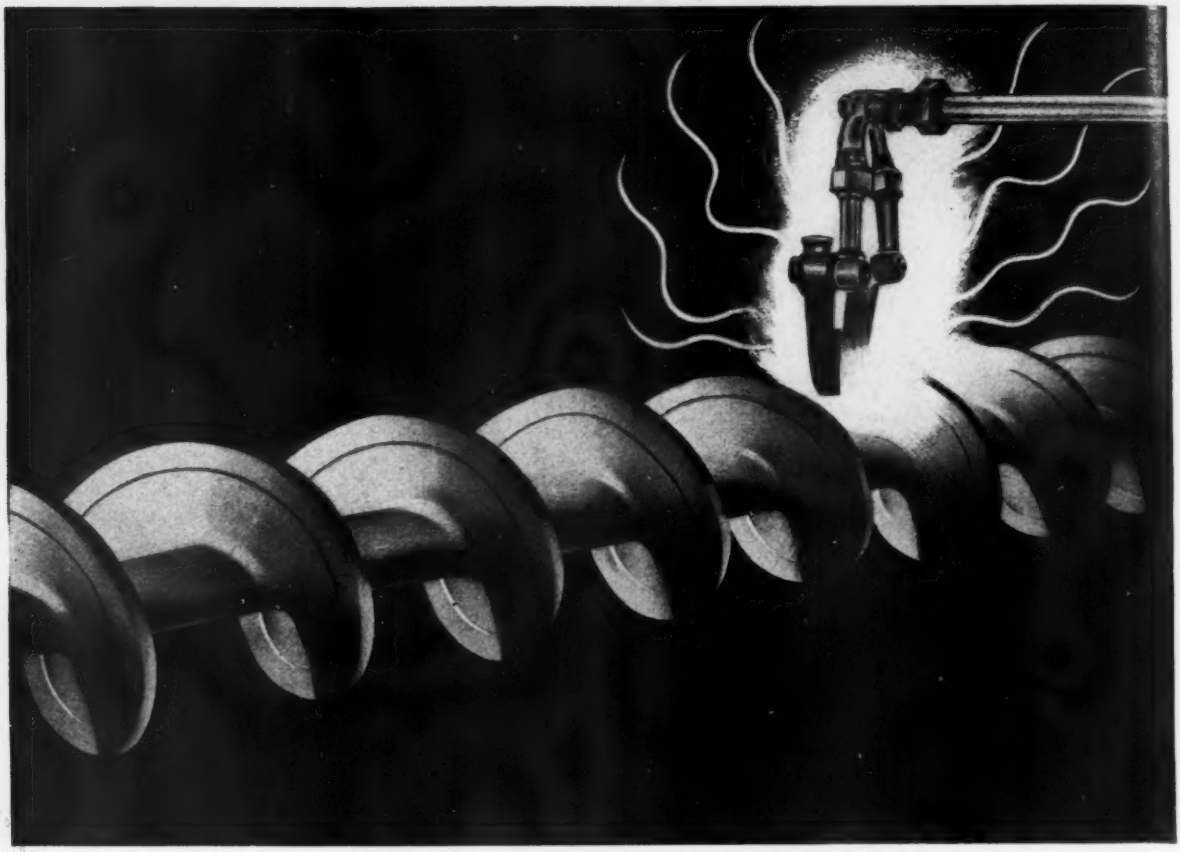

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MINING CONGRESS JOURNAL

Vol. 25 AUGUST, 1939 No. 8

In view of the vital concern of the mining industry with activities of the SEC, arising from the sizable proportion of total applications for security registration and exemption which deals with mining issues, readers will find unusual interest in the SEC discussion beginning on page 50.

An article criticizing the Commission's interpretation of its functions, which appeared in the June 25 issue of the New York Times under the authorship of G. Goldin, an attorney whose past experience in the office of the Commission's General Counsel commands respect for his views, is reprinted, together with a rejoinder by Baldwin B. Bane, director of the Registration Division of the Commission.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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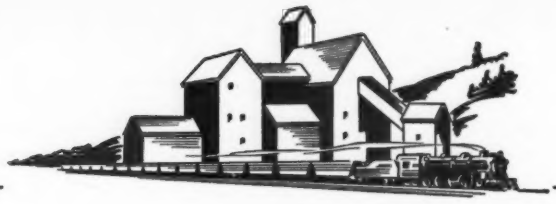

Forty-One Years Ago

ON JULY 6, 1898, the second annual convention of the American Mining Congress was held in Salt Lake City. The Hon. Heber M. Wells, now President of the Mormon Church, then Governor of Utah, in welcoming the delegates said: "If you are wise, constitute yourselves a power whose influence will be felt to such an extent as to prove of incalculable benefit to mankind."

The convention was attended by delegates from 28 states and territories and by representatives from Canada, Mexico, Venezuela, Peru, Turkey, Belgium and Australia. The principal discussion was upon the still contentious problem of the apex versus side line theory of mining claims, as to whether or not extralateral rights—the right of the locator of the apex or outcrop of a vein to the ownership of that vein into and through the adjoining property—should control in mine exploration and development.

A most memorable discussion in support of the apex theory was led by Judge Heyburn, afterward U. S. Senator from Idaho; and the view favoring revision was presented by Mr. W. S. Keyes, of California. These two men were then recognized as the most able of the many contenders in behalf of the opposing sides of this troublesome mining problem.

This discussion was based upon the minority and majority reports, respectively, of the Committee on the Revision of the Mining Laws appointed at the first convention of the American Mining Congress at Denver, July, 1897. The committee was to consist of a representative of each of the public-land states west of the Missouri River, but those who actually served on the committee were Professor R. A. F. Penrose, Arizona; Professor W. S. Keyes, California; W. S. Moore, Colorado; F. A. McReynolds, New Mexico; Professor J. E. Todd, South Dakota; Apostle F. M. Lyman, Utah; and G. B. Dennis, Washington, representing the Northwest Mining Association.

The majority of the committee recommended the abolition of extralateral rights and a minority urged retention. Almost two days were spent in this discussion, and the vote was fifty for and fifty against the adoption of the majority report.

These historical facts should be of interest as the Mining Congress again assembles in Salt Lake City. That all of the efforts to abolish the apex law should have failed is a tribute to our form of representative government under which only those issues upon which there is a general consensus of opinion are legalized, and the issues upon which no general agreement is reached by the interested public remain open until a rule can be determined which can command majority approval.

This problem so ably debated forty-one years ago has at various times since been discussed with vigor, but still remains. In Leadville, because of peculiar geologic formations, this law has always been ignored by mutual consent. In Arizona, under the wise suggestions of the late Dr. James Douglas and by mutual consent, the law has been made inoperative by agreements. In more recent times, the Cripple Creek District has adopted the side line theory by mutual agreement.

And thus the machinery of our government again demonstrates that popular will can always find a way to accomplish its purposes with or without the sanction of legal enactment.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 25 AUGUST, 1939 No. 8

Richard J. Lund, Editor

ALL ABOARD FOR SALT LAKE CITY

SALT LAKE CITY is all set for the large influx of metal mining men from all parts of the country scheduled to arrive within a fortnight for the 6th Annual Metal Mining Convention and Exposition opening August 28 and continuing through the week.

As a means of keeping abreast with latest developments affecting metal mining in the United States—economic, operating, legislative, fiscal, etc.—this event comprises the "red letter week" on the industry's annual calendar. The meeting is of incalculable value to the mine operator in serving as a real spur toward productive effort for the advancement of mining.

General conditions in the industry are more favorable than at the time of the Los Angeles meeting last fall. Silver prices are up and fixed at a definite figure; gold production is continuing at a high level; copper and lead demand and prices are moving ahead satisfactorily; the outlook for steel operations during the rest of the year presages a good year for iron ore and ferrous alloy consumption. Unfortunately, the zinc situation remains acute, resulting in considerable measure from the lowering of the zinc duty in the Canadian trade agreement. By and large, however, there is cause for not a little optimism, and the gathering at Salt Lake will form a suitable background for its expression.

Large groups of prominent mining men have contributed unsparingly of their time and effort in setting the stage for the meeting—planning a series of stimulating discourses on subjects of cardinal importance to the industry today, and in making arrangements for a week of worth while enjoyment in this romantic center of the intermountain empire. And an intensely interesting display of latest developments in mine equipment and supplies will be assembled by well known manufacturers.

Turn to pages 31-46 for a preview of what awaits you—then make your final plans to "hop on" at the "all aboard" call, and join with your fellow miners at Salt Lake August 28-31.

ZINC TARIFF ANALYSIS

THE recent analysis of the reduction in the tariff on zinc, released by the U. S. Bureau of Mines, has been widely publicized and received with great favor by the domestic industry.

Briefly, the study brought out forcefully that the 20 percent reduction in the zinc duty in the Canadian Trade Agreement aggravated the already unfavorable competitive position of the domestic zinc industry arising from its much lower grade of ore in conjunction with a mounting surplus of foreign production. From start to finish the statement is a splendid factual summary of the situation, revealing much careful study and observation of the industry over a period of years.

Since the signing of the treaty last November, several additional factors have developed to further aggravate conditions. Great Britain, herself, has slapped a heavy prohibitive tariff on non-Empire zinc imports, thus shunting the pressure of surplus continental supplies onto other markets; and freight rates from Europe on zinc have been lowered, thus amounting virtually to a further cut in our duty protection. Also, present critical world conditions place even a greater premium on the importance to national defense of a healthy domestic industry assuring adequate abnormal supplies.

The industry has not stood idly by in taking this blow on the chin, but has protested vigorously to Washington authorities in an endeavor to have the old duty reinstated. It is understood that leaders in the industry have arranged a meeting in the near future with the Committee for Reciprocity Information, at which time the serious conditions resulting from the tariff reduction will be analyzed thoroughly and an urgent plea made for application of corrective measures for which provision is made in the agreement.

It is greatly to be hoped that the State Department will recognize the justice of the claims made by leaders of the acutely distressed domestic industry, and will agree that the effects of the tariff reduction merit prompt corrective action in reinstating the original duty.

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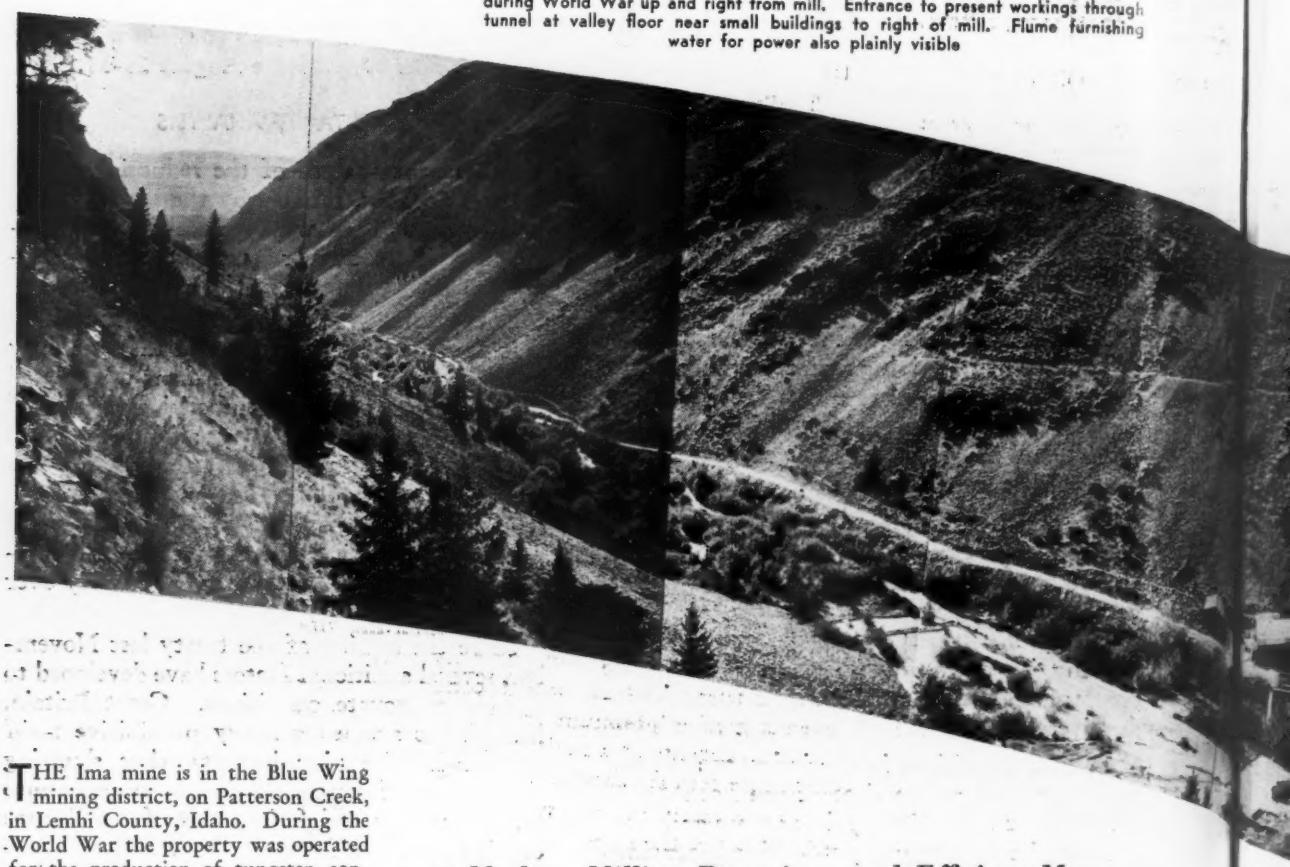

Panorama of Patterson Creek, Idaho, showing Ima mill in center. Old incline to workings developed during World War up and right from mill. Entrance to present workings through tunnel at valley floor near small buildings to right of mill. Flume furnishing water for power also plainly visible

● ***Modern Milling Practices and Efficient Management Have Reopened World War Operation and Raised It to Sizable Producer***

THE Ima mine is in the Blue Wing mining district, on Patterson Creek, in Lemhi County, Idaho. During the World War the property was operated for the production of tungsten concentrates, but was shut down shortly thereafter until it was reopened several years ago by the present owners and operators—the Ima Mines Corporation.

Geology

The mine is in an area of altered Precambrian sediments that may possibly be correlated with the Belt series of the Coeur d' Alene district. These sediments are predominantly quartzites and argillites with lesser amounts of schists and sandstone. The formations in the area adjacent to the mine have been folded into an anticline having a nearly north and south strike, the mine being located on the apex of the fold. This folding is probably the result of a granitic intrusion, as several dike-like masses of granite have been encountered in the lower workings of the mine, and there are indications that a large intrusive mass lies somewhat north of and below the present mine workings. No granite outcrops on the surface in the vicinity of the mine.

Patterson Canyon, a deep narrow canyon formed by Patterson Creek, cuts the anticlinal structure and empties into the Pahsimeroi Valley to the southwest. The canyon exposes a considerable section of the altered sediments, and cuts numerous quartz veins and stringers, the more prominent of which form the ore bodies of the Ima mine. These quartz veins strike northwest and dip from 30 to 60 degrees to the southwest. They vary in width from a few inches to over 15 ft., the average width of the veins mined being from 6 to 8 ft. The veins undoubtedly originate from the granite intrusion, the upper "fingers" of which are exposed in the lower mine workings.

The veins in the upper and outer workings of the mine are enclosed in the altered sediments, but in the deeper mine workings in the vicinity of the granite "fingers" the veins have a tendency to form along the contacts between the granite and the surrounding sediments. Several promising veins have recently been found completely within the granite. This is encouraging, as veins of this type will assume importance as the mine workings continue to depth.

The veins are predominantly quartz with minor amounts of fluorite, rhodochrosite, muscovite, and pyrite forming the gangue minerals. The ore minerals are hubnerite, silver bearing tetrahedrite, scheelite, galena, sphalerite, chalcopyrite and molybdenite.

There are several fracture zones running parallel with the vein systems, as well as other nearly flat structures striking at approximately right angles with the vein system. Faults of appreciable displacement are associated with both fracture systems, but as yet

Mining and Milling Tungsten at the Ima Mine

By W. P. BARTON
General Manager, Ima Mines Corp.
and
SAMUEL S. ARENTZ, JR.
Engineer, Ima Mines Corp.

the relation between the fracture systems has not been fully determined.

Ima Mine Workings

The Ima mine was originally developed by approximately 2,000 ft. of drift and crosscuts from a point on one of the outcrops about 220 ft. above the bottom of the canyon on its northwest side. (see illustration.) Several large stopes were mined on this level, but in general the veins on the level were badly fractured and faulted, so that mining was difficult.

More recent development of the mine has consisted of driving a haulage tunnel from a point just above the bottom of the canyon along the same vein developed by the upper tunnel, and from this lower level driving crosscuts and raises to develop this and parallel veins. A raise has been driven to connect the two tunnel levels, and from a point half way between the levels an intermediate level was driven both ways along the vein from the raise. Several stopes have been worked between the lower and intermediate levels, but approximately one-half of the daily mill tonnage has come from development work on these two levels.

There are approximately 3,500 ft. of drifts and crosscuts on the lower level, and nearly 1,000 ft. of drift on the intermediate level. The present face of the lower tunnel is approximately 1,800 ft. from the portal, and a drift has been advanced 1,000 ft. on a paralleling vein to about the same distance from the portal. A drift on a third vein is approximately 400 ft. long.

Recent diamond drilling has shown the presence of still other veins in the walls of the present ore bodies. The faces on the lower tunnel are approximately 1,000 ft. below the surface with several raises showing good ore for at least 100 ft. above the level.

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All of the mine development has been done on the north side of the canyon. Prominent outcrops exist on the south side, and in all probability development there would give equally satisfying results.

Mine Operation Described

The Ima mine is still in the development stage despite its continuous productive operation over the past year. The operation is influenced by this consideration. The ore is complex, so that continued research is required in the mill to effect a more satisfactory solution of the metallurgical problems involved, and in the mine continued development and prospecting form an important part of the operation. Nearly half of the ore produced by the mine is supplied by the development headings.

The veins are of fairly uniform width, averaging about 7 ft., and have a nearly constant dip of 55 degrees to the southwest. The filled square set system of stoping is used, as the hanging walls are heavy and the stopes have a tendency to swing unless adequately supported. The method employed reduces dilution of the ore to a minimum; the average head sample of the mill feed is very close to the calculated head sample from channel samples of the stope faces. The stope faces vary from 0.25 percent WO_3 to over 5.0 percent WO_3, and the mill heads average 0.64 percent WO_3.

The standard stope timbers are square sets framed from native round timber. The sets are on 4 ft. 8 in. by 4 ft. 8 in. by 7 ft. 1 in. centers, and the usual practice is to use caps running the full width of the stopes. The stoping is done on contract, the contractors receiving $16 for a standard set, the company furnishing all supplies and the contractor furnishing all labor required for breaking the ore, timbering the ground, spreading the fill, and, in general, keeping the stope in shape. The stopes are worked on one shift by a contract crew of three men to a stope, the crews on the various stopes being staggered so that half are on day shift and the other half on night shift. The fill is generally carried about two floors below the stope face. Ore passes are carried on about 20 ft. centers and there are generally manways every 60 ft. The ore chutes are lined with 3-in. plank and enclosed in slab lagging carried outside the supporting timber.

The development work consists of advancing raises between the levels and of driving drifts along each of the three veins being developed. Crosscuts are driven to connect the three veins at intervals of several hundred feet, and prospect crosscuts have been driven into the foot and hanging walls of the known veins to locate other parallel veins.

The development raises have two and three compartments, and are contracted on the same basis as are the stopes. The raises are timbered with standard stope sets, and consist of a manway and one or two chutes. The chutes are used for passing waste for stope fill when stoping operations are conducted in the area of the raise.

There are two types of contracts let on the drifts and crosscuts. In the first type a machine man contracts to break the ground for $1.50 per foot, and a company crew removes the broken rock with the mechanical loader. Any timbering necessary is done by the company timbermen. In the second type of drift contract, a crew of two or three men receive $3 to $4 per foot for furnishing all the labor incident to advancing the heading, the price depending upon the length of tram and the amount of timbering required.

The mechanical loader used by the company has given very satisfactory service, and has resulted in a considerable saving of both time and money in advancing drifts and crosscuts on the main tunnel level.

The underground equipment consists of medium weight self-rotating stoper drills, medium weight hand-cranked drifter machines, and 16 cubic foot, roller-bearing mine cars, in addition to the battery locomotive and mechanical loader. All of the drills use 1-in., quarter-octagon drill steel with plain shanks.

Production and Employment

For the past year the mine production has averaged 115 tons per day. From this daily tonnage the mill has recovered 6 tons of sulphide concentrate containing silver, lead, copper, and zinc, and about 1,400 lb. of tungsten concentrate containing 66 percent WO_3.

The mill employs 20 men including a carpenter, a mechanic, an electrician, and a man on tailing disposal. The number of men employed is greater than in the average mill treating the same tonnage, but the number of operations required to treat the ore make the greater number of men a necessity.

The mine employs a crew of 33 men including a surface crew composed of a blacksmith, two timber framers, and two surface trammers. Most of the underground crew work on contracts, the remaining company men include two operators for a battery locomotive, two operators for a mechanical loader, a maintenance crew, and special timbermen and helpers.

The mine surface plant consists of two diesel-driven, high speed Gardner-Denver compressors, a drill sharpener, an oil forge, and the usual blacksmith shop equipment. There is a suitable change house and shower room for the mine crew.

The development work has shown the veins to be continuous and of uniform width. The work has resulted in the development of a substantial tonnage of ore, though a great deal of work remains before the mine may be said to have passed the development stage.

Development of Present Milling Operations

According to the only records available for the mill operation during the early World War period, the recovery in the mill was approximately 26 percent and the grade of tungsten concentrate was about 45 to 50 percent WO_3. The flow sheet of their mill during this period was roughly as follows: Primary crusher of Blake type to Wall corrugated rolls to hydraulic classifier; over-size from classifier to smooth rolls, then back to classifier, which was set in closed circuit with the rolls; fines from classifier to jigs, and from jigs to tables. It appears that the jigs and tables were relied upon entirely to make a clean concentrate, which seems to account for the low recovery and, also, for the poor grade of concentrate.

As has been before noted, the ore minerals are hubnerite, tetrahedrite, scheelite, galena, sphalerite, chalcopyrite and molybdenite. Upon examination of tailings resulting from the operation mentioned above, it was noted that probably 30 percent of the hubnerite was not liberated from the gangue, due to the course grinding by rolls. The entire tailings pond indicated that the grind was approximately 75 percent plus 12 mesh.

Further examination was made of ore in the various veins and it was noted that a large portion of the hubnerite was finely disseminated through the quartz. Experiments were then conducted as to a proper fineness to which the ore should be ground to liberate the hubnerite, bearing in mind

at all times, that if it were ground too fine, the results would be slimes, which are practically impossible to recover. From these tests, it was decided that about 45 mesh would be the ideal point to grind.

Having this information in mind, we installed a primary crusher, ball mill and Dorr classifier. The ball mill used was a Marcy with compensating grates, the widest distance between the grates being ⅜ in. By using a rather dilute circuit to the ball mill, we found the discharge to be about the mesh desired. Classifier sands were returned to the ball mill; classifier overflow went to flotation.

At this period it might be interesting to note that we made an attempt for several months to recover the hubnerite by flotation, after first floating the tetrahedrite, galena, sphalerite, chalcopyrite, molybdenite and iron pyrite in the usual manner. In the attempt to float the tungsten, we tried to follow information obtained from the Bureau of Mines. We were successful in getting a product of around 39 to 40 percent WO_3 for only short periods of time, the circuit, for various unaccountable reasons, not having been properly controllable. The reagents used in this experiment were oleic acid, solium oleate, together with various depressants. Consequently, the attempt to make a commercial concentrate with reasonable recovery by flotation was abandoned.

We then attempted to classify the ball mill discharge carefully and make a commercial product by tabling only. We found that the grade of our product could be held at around 55 percent WO_3, the contaminants being principally ball mill iron and iron pyrite, which resulted in a high sulphur content. We ascertained at this point that it would be a comparatively simple matter to roast the concentrate, thus rendering the pyrite magnetic, and take out the ball mill iron together with the pyrite, magnetically. Our recovery using this method was extremely low, however, due to the fact that an extremely fine cut was necessitated on the tables, and although table middlings were retabled, we were unable to hold our recovery above 60 percent.

At this point, we began experimenting with magnetic separation, not only for the removal of the iron, but also for the removal of the hubnerite from the gangue, with the view that if the hubnerite could be successfully removed from the gangue, it would not be necessary to make such a fine cut on the tables; in other words, to make a table middling and separate both iron and hubnerite magnetically from such middling. Finding this process to be feasible, we installed a Dings low amperage magnetic separator for the removal of the iron, and a Rounds Weatherall high amperage magnetic separator for the removal of hubnerite. This installation was not made until results were checked carefully in several laboratories and testing plants, including that of the Colorado School of Mines. We still had somewhat of a problem of sulphur contamination resulting from iron pyrite, and as the magnetic separation feed necessarily had to be dried, we installed a rotary oil blast furnace. This not only dried the concentrate, but permitted us to roast the pyrite, thus rendering it magnetic, and to burn out what sulphur was combined with the hubnerite. Finding this process to work in a satisfactory manner and to give us an average grade of 66 to 70 percent WO_3, we then started to work on low recovery. This was done by the installation of vibrator screens before the ball mill feed, over-size going to ball mill and under-size to Denver mineral jigs. This operation worked so successfully that we installed more such jigs between the ball mill discharge and the classifier, and another jig between the sulfide flotation cells and the tables.

Present Flow Sheet Summarized

Our flow sheet resulting from this work is as follows: Primary crusher, set to maximum of 1 in., to ore bin; ore bin feed to 3/16-in. mesh vibrator screen; over-size to ball mill, undersize to Denver Sub-A unit cell, for the removal of coarse sulfides; sulfides to thickener tank, filter and to market; unit-cell tailings to 16 in. x 24 in. Denver mineral jig; jig tailings to ball mill; jig hutch product (approximately 20 to 30 percent WO_3) to roaster. Marcy 64½-in. compensating grate ball mill (maximum ⅜-in. opening) through ¼-in. mesh spiral screen, over-size return to ball mill, undersize to two 12 in. x 18 in. Denver mineral jigs; jig tailings to Dorr classifier; jig hutch product (approximately 20 to 30 percent WO_3) to roaster; classifier sands returned to the ball mill; classifier over-flow through Wilfley sand pump to 6 Denver Sub-A flotation machines (4 roughers and 2 cleaners); flotation product, which is silver, copper, lead, zinc, and molybdenum to thickener tank, filter and to market.

Flotation tailings through Denver mineral jig, which discharges on 5 Plat-O tables. Jig hutch product (approximately 20 to 30 percent WO_3) to roaster, table product (20 to 30 percent WO_3) to roaster; table tailings to waste.

All products going to the oil blast rotary roaster are fed with scoop feed and discharged on cement floor for cooling. Part of the roaster equipment is a large dust collector which recovers from 600 to 800 lbs. of high grade flue dust tungsten per month. After roaster product is cooled, it passes through the Dings magnetic separator, operating at 4 to 5 amperes, which removes the circuit iron and roasted pyrite; product from this machine is then passed through the Rounds Weatherall magnetic separator, operating on 17 to 20 amperes, which removes the hubnerite from the gangue. Tailings from this machine are passed over a Plat-O table from which a slight recovery is made in sulfides and tungsten. This table acts as a scavenger only. As before stated, the grade of our tungsten is from 66 to 70 percent WO_3, and recovery is approximately 85 percent. The tungsten concentrate is bagged in double paper lined burlap bags of even 100 lbs. weight, and trucked from this point to MacKay, Idaho, for shipment by railroad to market.

Note that the molybdenum is floated off with the sulfide concentrates. Considerable work has been done which promises the ultimate recovery of this mineral from the sulfides. It is expected that the molybdenum plant, which will follow the practice of several of the large operators, will be installed this summer.

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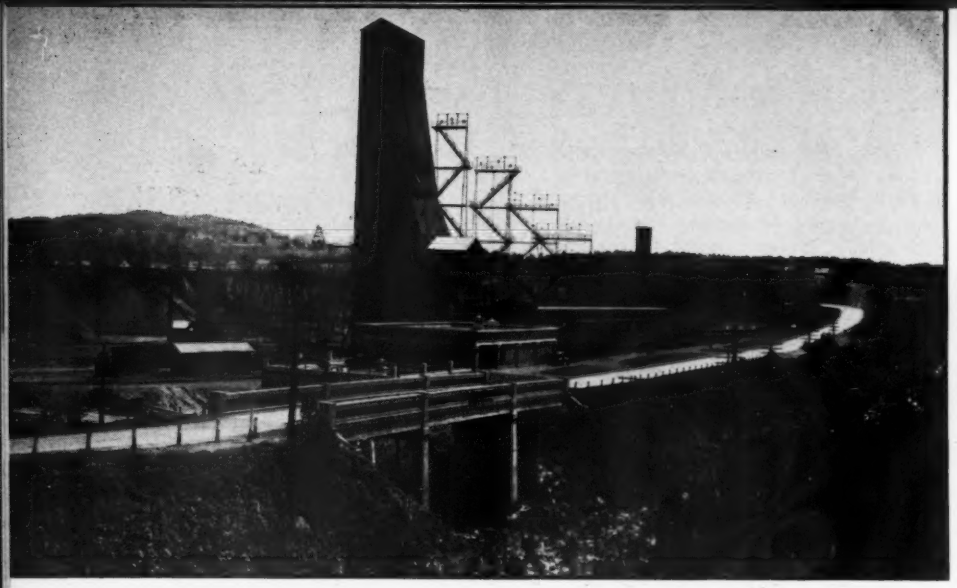
Montana Mining Association

The Mining Association of Montana will hold its annual convention in Bozeman, Mont., August 18 and 19, according to an announcement from Carl J. Trauerman, president.

One of the principal speakers on the program will be Julian Conover, secretary of the American Mining Congress, who will address the gathering on important legislative and economic matters now facing the metal mining industry.

The convention will open with registration of delegates at 10 a. m., Friday morning, and the first business session is scheduled for 2 o'clock that afternoon. Business sessions will be held Saturday morning and afternoon, and the main social event will be the banquet to be held Saturday night, marking the close of the convention.

State officers who will be in charge of the convention, besides Mr. Trauerman, are Harry C. Bacorn, Cable, vice president; August Grunert, Butte, secretary, and Dr. F. A. Thomson, Butte, chairman of the executive committee.



Surface Plant of the Eureka mine. Buildings, left to right: New change house, shop building and engine house. Shaft house in center background, and stockpile grounds in left background

A MODERN CHANGE HOUSE on the Gogebic Iron Range

● ***Careful Temperature and Humidity Control of Ventilation Features New Dry of The Castile Mining Company's Eureka Mine, Which Incorporates Very Latest Designs to Insure Maximum Comfort of Miners in Changing Clothes***

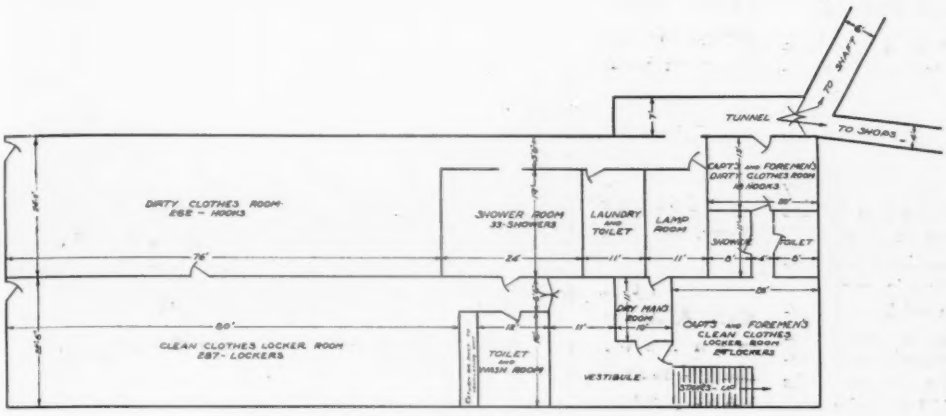
By DAN S. YOUNG
Chief Engineer
The Castile Mining Company

THE Castile Mining Company's Eureka Mine Dry at Ramsay, Mich., is the newest in the Lake Superior district. Initially occupied August 15, 1938, it incorporates many new ideas in dry design. It was designed by N. Albert Nelson, architect, of Ironwood, Mich., in collaboration with the engineering department of the Castile Mining Company. The Eureka mine is located on the eastern end of the Gogebic Iron Range and has been a steady producer of iron ore since 1890. It is at present the deepest iron mine in the Lake Superior District, the shaft having a vertical depth of 3,362 feet. Oglebay, Norton & Company, Cleveland, Ohio, are operating and sales agents.

The design of change houses in the Lake Superior mining district has gradually improved since the beginning of mining in the area, and today the change house at the Eureka mine stands as a modern example of an employer's effort to make the life of the employe a clean and pleasant one. The first change houses, or "drys," as they are termed locally, were frame sheds containing rows of steam pipes upon which the clothes were hung, and wash basins where the miners could attempt to remove the tenacious hematite dirt from the exposed portions of the body. Wooden lockers were introduced. The shower bath came, but was rather slow in being accepted by the surprisingly modest miners. The wooden lockers were replaced by steel. The buildings became permanent and well-built structures. Gradually the facilities for the miners were improved.

The thought uppermost in the minds of the men interested in the design of this dry was the erection of a fireproof building that would best serve the needs of miners working in a wet, dirty mine. They wanted to eliminate the intermingling of men dressed for street and mine; to dry the wet underground clothes without the use of excessive heat so often nearly unbearable in the old drys; to isolate the hematite dust so offensive to all, especially to the miner's wife; and to eliminate the dust created by the handling of dirty mining clothes after drying. In short, it was their desire to create a modern dry that would be readily adaptable to possible future conditions.

The building is of concrete and brick construction, with outside overall dimensions of 50 ft. 8 in. by 143 ft. 8 in., the long dimension trending about east-west. It has two stories for 82 ft. of its length and one story the remaining portion. The dry proper occupies the lower story, the floor of which is 14 ft. below the grade of the county highway that passes in front



Plan view of Eureka mine change house (not drawn to scale)

of the building. The ceiling height of the dry proper is 13 ft. The second story is at grade with the highway, and is used as a garage and warehouse. The second story portion is of brick construction, harmonizing with the other buildings on the property, whereas the dry proper is entirely of concrete. The entire building is without windows. The roof of the two-story portion is steel decking, and that of the single story portion is concrete, both being insulated and covered with a built-up, four-ply pitch and gravel roofing. All partitions are of hollow tile, and all interior walls of the dry proper are plastered. The doors to the garage and warehouse, as well as the main entrance door, are of wood. All interior doors are of steel.

Separate Rooms for Clean and Dirty Clothes

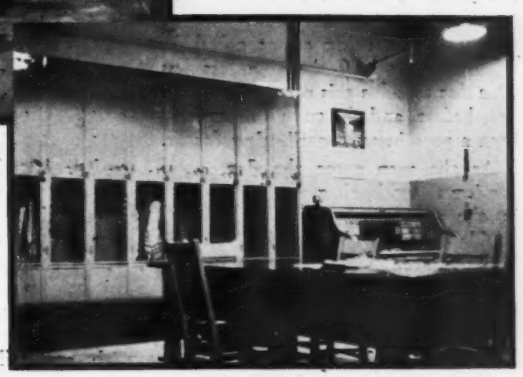
The entrance to the dry is at the east end of the building, from which an inside stairway leads down into the vestibule. This concrete stairway is covered with a plastic compound to insure against slipping. The dry is divided longitudinally into halves—one termed the "clean side" or "street side" and the other the "mine side" or "dirty clothes side" (see plan of building).

The "street side" consists of the vestibule, dryman's supply room, combined washroom and toilet room, large clean clothes locker room, the captain's and foreman's clean clothes locker room and office. In the vestibule are the time clock and bulletin board. The dryman's room is used as a supply depot and also as a timekeeper's office and pay office. The combined washroom and toilet room is equipped with two spray type wash troughs, four toilets and a urinal. The large locker room has 287 lockers that are used only for clean clothes. All lockers are permanently set in the concrete floor and have wooden benches attached. The captain's and foreman's room has 24 lockers and is used daily as a meeting place for all departmental heads.

The "mine side" of the dry consists of the large dirty clothes room, shower room, toilet and laundry, electric lamp room and small dirty clothes room used by the foremen. The large dirty clothes room is about 77 ft. by 24 ft. The underground clothes are exposed to drying and aeration by being suspended from the ceiling on specially designed hooks. The room contains 262 hooks with one hook allotted to a man. Each hook, so designed that clothes properly hung will dry thoroughly, is attached to an endless chain passing through a pulley suspended from the ceiling. The chains are equipped with rings which permit the locking of the hooks after they are pulled up; each man is supplied with two combination padlocks of the same combination, one for the clean clothes locker and one for the dirty clothes hook. The suspension structure for these hooks is of pipe and steel construction and is hung from the ceiling, the hanger straps having been set in the roof slab at the time of pouring. Each hook has a small wire basket attached that is suitable for holding incidentals that the miners prefer to remove from their clothes. Between each row of hooks is a stationary bench constructed of steel, with a plank top.

Adjoining the dirty clothes room is the shower room. This room is about 23 ft. by 19 ft., with a 9-ft. wainscoting of glazed brick on the walls. It contains 33 shower heads, each equipped with mixing valves. All hot water supplying the dry passes through a controlled mixing valve, thus eliminating the hazard of scalding. A 2-in. pipe railing parallels the walls of the room about 1 foot above the floor and 1 foot out from the walls to facilitate the washing of feet. Liquid soap dispensers are distributed throughout the room; the liquid soap is piped from a mixing and storage tank located in the garage above the shower room.

Above—large clean clothes locker room



Right—Corner of mine captain's and foremen's clean clothes locker room

Laundry Equipment Supplied

From the shower room a door leads into the hallway connecting the vestibule and the large locker room on the street side of the dry. The toilet and laundry room is equipped with two toilets, urinal and small lavatory, and stationary laundry tubs. The laundry equipment is used by the men for the washing of underground clothes.

The lamp room contains the charging racks for the electric cap lamp batteries and is also used by the dryman in giving out supplies to the men after they have changed to underground clothes. The present racks have a capacity for 200 batteries with additional space available, should the neecssity arise. The small dirty clothes room used by the foremen is similar in design to the large room and contains 18 hooks. Between this small dirty clothes room and the foremen's clean clothes room is located a small shower room and toilet room. The shower room has 2 heads and is finished with glazed brick, in the same manner as the large shower room. The toilet room is equipped with one toilet and a lavatory.

Tunnel Connects Dry with Shaft

The dry is connected to the shaft by a concrete tunnel 70 feet in length. This tunnel has two entrances, one directly opposite the lamp room and the other leading from the foremen's dirty clothes room. Because of this arrangement, all men entering or leaving the mine must pass the foremen's room giving the foremen an opportunity to contact anyone they may wish to see. The end of the tunnel is extended a few feet beyond the main entrance into the dry; here are located four short lengths of hose for use by the men in washing their boots. Along one side of the tunnel is a permanent bench where the men sit when waiting to go on shift. The tunnel eliminates the necessity of the men subjecting themselves to severe temperature changes when going on or off shift. Records show that the men lost less time due to colds this past winter than ever before, and the tunnel must have been a prominent contributing factor.

As the men enter the dry, upon coming to work, they punch the clock in the vestibule, then pass through double doors into a short hallway and into the large locker room where they remove their street clothes. From here they enter, through a one-way door, the large dirty clothes room on the "mine side" of the dry. After dressing in their underground clothes the men walk down a hallway past the shower and toilet rooms, stop at the lamp room for their lamps, and pass through the tunnel to the shaft. After the men have changed to their underground clothes they are not permitted to go into the "clean side." As they come off shift all men take a shower bath before entering the "clean side" of the dry.

Large dirty clothes room. Warm air duct in upper left. Registers under benches lead to return air ducts under floor

A small branch tunnel connects the dry with the basement of the shop building, this tunnel permitting passage between the dry and shop building without going outside.

Ground Corundum in Concrete Floors Minimizes Slipping

The interior of the street side of the dry is painted white with a grey dado that matches the grey lockers. The mine side is painted white with a dark red dado. The floors are of concrete and are unpainted. Wet concrete floors always present a slipping hazard that has been diminished to a minimum in this dry by introduction of ground corundum into the concrete just as the final troweling was being done.

Heating and Ventilation Unique

The heating and ventilating of this building is unique in dry construction. It was designed by E. Orrick of Walker Jamar Company, Duluth, Minn., in collaboration with the architect and the mining company engineering department. The street side is heated by unit heaters, with one unit connected to the outside by a duct that permits the introduction of fresh air whenever needed. The dampers in this duct controlling the air flow are manually controlled, and can be set to introduce only fresh air, to recirculate, or any combination of the two. All unit heaters are controlled by thermostats. Air is exhausted from the street side through roof ventilators equipped with manually controlled dampers. The garage is heated by a unit heater. The warehouse is not heated directly, but the loss of heat from the heated rooms below is sufficient to keep the temperature above freezing.

The mine side of the dry is heated and ventilated by a central unit located in the warehouse. This unit supplies about 9,000 c.f.m. of which about 8,000 c.f.m. goes to the large dirty clothes room, causing a complete change of air every three minutes, and the remainder to the small dirty clothes room and other outlets.

The air is introduced into the rooms from an interior duct at ceiling elevation this duct running the full length of the building along the outside wall. It is 36 in. by 30 in. in cross-section at the fan, diminishing to 24 in. by 12 in. at the far end of the large dirty clothes room and to 20 in. by 12 in. at the end in the small dirty clothes room. There are twenty-eight 12-in. by 8-in. grilles, spaced uniformly in the duct, in the large room, three grilles in the small dirty clothes room, and one each in the laundry and lamp rooms. The duct is fitted with splinter dampers at each grille to control the distribution of air through the rooms. Air coming from the grilles moves across the room above the clothes to the opposite wall; from there it is deflected back and downward through the clothes.

The return air from the two dirty clothes rooms is handled in concrete ducts beneath the floor. Two ducts with fourteen 14-in. by 10-in. openings run the length of the large dirty clothes room and join a single duct from the small room which has three openings in that room. From this

junction a single duct passes across the building to a point between the large locker room and the wash room on the street side. Here the air goes up to the ventilating unit to pass through a filter bank and be recirculated. The openings in the floor are provided with registers and are located under the benches. The ducts are provided with drains, and all pitch to the drains, permitting periodical washing out of dust accumulations. Air is exhausted from the shower, laundry, and lamp rooms through roof ventilators.

It should be noted that warm air is introduced at ceiling elevation and removed at the floor, reversing the usual procedure. This is done for two reasons: first, to gain any possible settling advantage resulting from the high specific gravity of hematite dust; and secondly (and most important) to move the dusty air down and away from the faces of the men dressing. The underground clothes after being dried are very dusty; the most severe dust condition occurs as the men are putting them on. Consequently, an upward circulation of the air would carry the dust past the faces of the men, whereas a downward movement carries the dust down and allows the men to breathe air comparatively free from dust.

Ventilation and Heating Control

The ventilating and heating unit consists of a fresh air and recirculated air mixing chamber controlled by interconnected dampers on both openings; a filter section; a face and by-pass damper section controlling the air passing through the heating coils; a heating coil section; an inlet vane control section that controls the amount of air supplied, and a fan section. All dampers in this unit, as well as the dampers in two roof ventilators from the large dirty clothes room, are electrically operated and automatically controlled. It is possible, however, to control the entire system manually and by so doing to rapidly cool the rooms for the comfort of the men changing clothes. The room temperature can be cooled to outside temperatures, under the system as installed. Outside summer temperatures in this region are not high enough to warrant the introduction of artificial cooling in this type of building. A temperature of 85 degrees F. to 100 degrees F. is maintained for drying, dependent upon the relative humidity of the outside air. During the winter months the relative humidity of the outside air is so low that the clothes can be dried with the minimum temperature, but in the summer the higher dry bulb temperatures are required.

The dry bulb temperature of the mine side is controlled by a dry bulb thermostat located in the recirculated air duct, this thermostat operating the modulating type face and by-pass damper in the central unit. The operation of this damper is such that as more heat is required the face damper opens wider allowing more air to pass through the heating coils; inversely, should less heat be required, the face dampers will close and the by-pass dampers open. To prevent unduly chilled air from entering the room a low temperature control thermostat is located in the discharge duct and functions to prevent the discharge air from the fan from going below a predetermined setting.

Humidity Carefully Regulated

The humidity of the room, so important in the drying of the clothes, is controlled by a wet bulb thermostat located in the recirculated air duct close to the dry bulb thermostat. The wet bulb thermostat operates a modulating type damper motor which controls the fresh air damper and the recirculated air damper in the central unit. Its action is such that with an increase of humidity in the recirculated air the fresh air damper will open to admit more fresh air and dilute the moist air to a satisfactory humidity. In addition to the above, the wet bulb thermostat controls two damper motors in the two roof ventilators from the large dirty clothes room. Their action is synchronized with the operation of the fresh air damper so that as more fresh air is admitted the dampers in the roof ventilators are opened wider and wider, permitting the exhausting of the damp air.

Corner of shower room. Pipe railing close to floor facilitates washing of feet

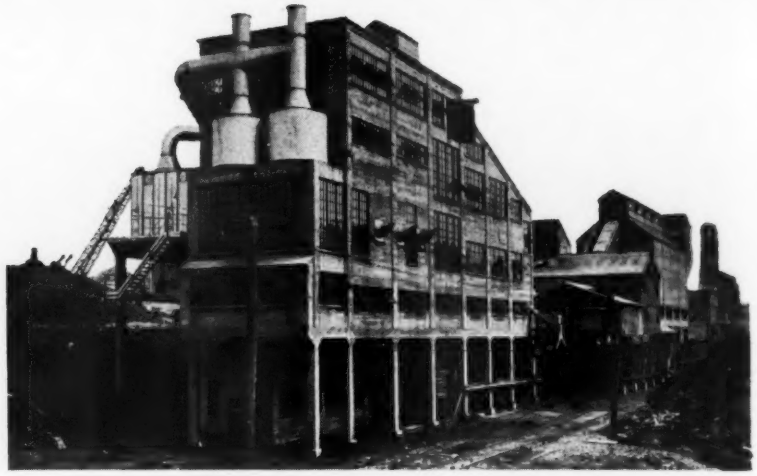
A mixed air thermostat, incorporated with the fresh and recirculated air damper motor circuit, is located directly back of the filters. The function of this thermostat is to prevent too cold an air mixture being admitted to the heating coils. Also included in the fresh air damper motor control circuit is a manual and automatic selector switch and a manual ventilation switch to allow manual positioning of the fresh and recirculated air dampers, and the dampers in the roof ventilators, as stated above. These switches are located in the dryman's room.

Through a relay, the fresh air damper motor is interlocked with the fan motor circuit in such a way that if power to the fan motor fails, the fresh air damper and dampers in the roof ventilators will close automatically. In addition to this safety relay, two heat exchanger thermostats are located in the condensate return to the heating coils, which operate to shut down the fan and to close the fresh air damper on failure of the steam supply.

The fan for this central unit is driven by a 220-volt, 3-hp. motor, the power being supplied through a three-phase circuit controlled by a magnetic starting switch. This switch is equipped with two push-button stations, one located near the motor on the control box and the other located near the manual and automatic selector switch in the dryman's room.

The introduction of the ventilating system in this dry marks the end of the discomforts of the old change houses. The constant, excessive heat to dry the clothes is no longer necessary. If the relative humidity of the outside air is so high that high temperatures are required for drying the clothes, the rooms can be quickly cooled for the comfort of the men as they change. The division of the dry into a clean clothes side and dirty clothes side does away with the mingling of men dressed for the street with those dressed in dirty underground clothes, and gives the men a clean place in which to keep their street clothes.

MATHER COLLIERIES NEW PREPARATION PLANT



Cleaning plant at Mather, with tipple and shaft at right

● *Cleans Entire Output By Combination Wet and Dry Process with Gratifying Results*

By FRANK B. DUNBAR
Manager, Mather Collieries
and
RAY MIDDLETON
Roberts and Schaefer Co.

ABOUT fifteen years ago the Mather Collieries Company, owned and operated by Pickands, Mather and Company of Cleveland, Ohio, seriously began the study of mechanical cleaning as well as mechanical loading of their coal.

Their property located at Mather, Greene County, Pennsylvania, near Waynesburg, on the Monongahela Railroad, contains over three thousand acres of Pittsburgh seam coal, varying in sulphur from one percent to over two percent and with a varying ash content.

Heretofore, in order to meet the very exacting low sulphur requirements of their metallurgical market, various selective mining methods were employed. At intervals during this long period, particularly in 1929, 1934, and again in 1937, the subject of a coal cleaning plant was seriously considered and a very careful study of various known processes made.

Finally in the spring of 1938 it was decided to abandon selective mining and reduce underground loading costs by the installation of loading machines, which brought up the problem of mechanical cleaning. Decision was made shortly thereafter on the mechanical cleaning of the mine's entire output with a combination wet and dry plant, using improved hydro-separators on the coarse coal and Stump air-flow boxes on the fine coal, after a very thorough test of one thousand tons of the company's coal over the combination wet and dry plant of the Pittsburgh Coal Company at Negley, Ohio.

The Roberts and Schaefer Company, Engineers of Chicago, were chosen to design and build the entire plant to the Mather Company's specifications, which called for a run-of-mine dumping rate of 450 tons per hour, with facilities for handpicking and crushing the 4" lump and blending the high and low sulphur coal in a large raw coal mixing bin.

Plant of Modernistic Design

The plant which was put in operation in November, 1938, is very unusual because it is of modernistic design, being built entirely of reinforced concrete with wide expanses of window glass which gives it more of the appearance of a New England knitting mill rather than a bituminous coal preparation plant.

The run-of-mine coal is hoisted up the 385-ft. shaft in three-ton capacity mine cars at the rate of 150 cars per hour. At the top of the head frame it is weighed on a 6-ft. wide by 15-ft. long pan-type weighing conveyor which will be abandoned as soon as the entire mine is mechanized. About half of the coal mined at present is mechanically loaded.

This weighing conveyor delivers the run-of-mine coal to a small feeder hopper, from which it is fed at the rate of 450 tons per hour by a variable speed reciprocating plate feeder to a 6-ft. wide double section balanced shaker screen dressed with a 12-ft. length of 4" screen plate. This screens out the minus 4" coal which is diverted direct to the upper strand of a raw coal flight

conveyor for delivery to the mixing bin.

Lump Is Hand Picked

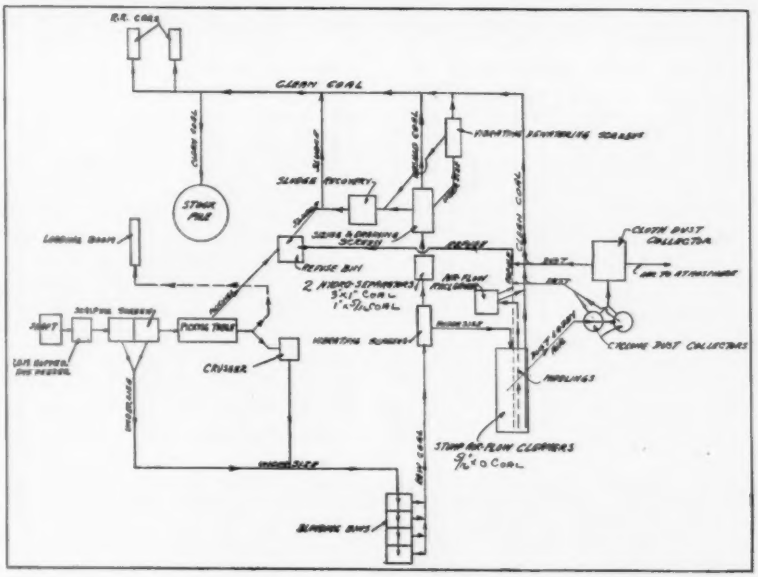
The plus 4-in. lump coal, which amounts to 15 percent of the run-of-mine, is conveyed by the shaker screen to a 5-ft. wide double section balanced shaking picking table which provides ample facilities for hand picking. After the lump is hand picked it can either be delivered by the lower section of the picking table to an apron loading boom and loaded direct on the outside track, or it can be by-passed through gates in the picking table to a double roll crusher which crushes it to minus 4-in. and delivers it to the upper strand of the raw coal flight conveyor to unite with the natural minus 4-in. coal for delivery to the mixing bin.

As a precaution against damage to the crusher and rubber belt conveyor going to the cleaning plant proper, electric magnets are suspended over the picking table to remove machine bits and tramp iron that the pickers might miss.

Coal Mixed Ahead of Cleaning Plant

At Mather the problem is mainly one of sulphur reduction to meet a most exacting metallurgical market, and since the raw coal from a few sections of the mine runs as low as one percent sulphur and from other sections considerably over two percent, it was decided to use a mixing or blending bin in order to deliver a raw coal of more or less constant sulphur content to the cleaning plant.

This bin, constructed over the railroad tracks about 100 feet above the tipple, has a total capacity of 1,500 tons, and is of reinforced concrete construction with four compartments—one each for high, low, medium high, and medium low sulphur.



Flow sheet of cleaning plant

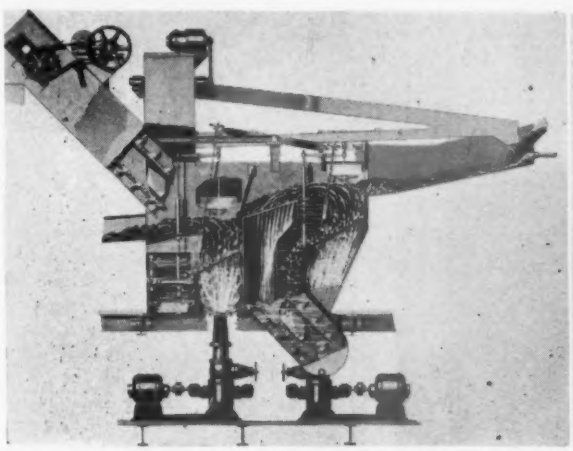
The mixing bin is served by a long flight conveyor whose upper strand delivers the raw coal through rack and pinion hand-operated slide gates to any compartment of the bin. The lower strand of this same flight conveyor receives the raw coal from any or all four compartments of the bin in any proportion of high and low sulphur coal desired, through eight variable speed reciprocating plate feeders, two for each compartment.

The 4-in. by 0-in. raw coal is then conveyed back to the point in the tipple whence it came and deposited on a 36-in. wide rubber belt conveyor at the rate of 360 tons per hour. This belt conveyor elevates it to the top of the cleaning plant proper, which is located over the railroad tracks and about two hundred feet below the tipple.

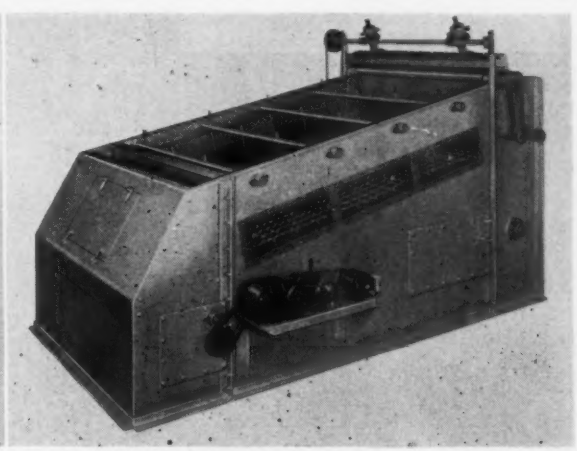
At the top of the cleaning plant the 360 tons per hour of 4-in. by 0-in. raw coal feed is split equally to two 4-ft. by 16-ft. double deck horizontal vibrating screens which screen the raw coal product in more or less equal proportions of 4-in. by 1-in., 1-in. x 5/16-in. and 5/16-in. by 0-in.

The 120 tons per hour of 5/16-in. by 0-in. fine coal to be air cleaned is collected in hoppers under the vibrating screens, and to prevent segregation, is very carefully delivered by means of short screw conveyors to two 25-ton surge bins, one each for the 6-ft. wide primary Stump air-flow boxes.

Each bin is equipped with high and low "Bin-Dicators" with indicating lamps on the control board. Coal is



Cutaway view showing action of hydro-separators



Stump Air Flow coal cleaning unit six ft. wide

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fed out of the bins by independently driven feeders, each with separately controlled motor which facilitates regulation and together with the bin level indicators, make it possible to adjust feeding rates so that both primary boxes will have coal at all times.

Two-Part Instead of Three-Part Separation by Primary Air Boxes

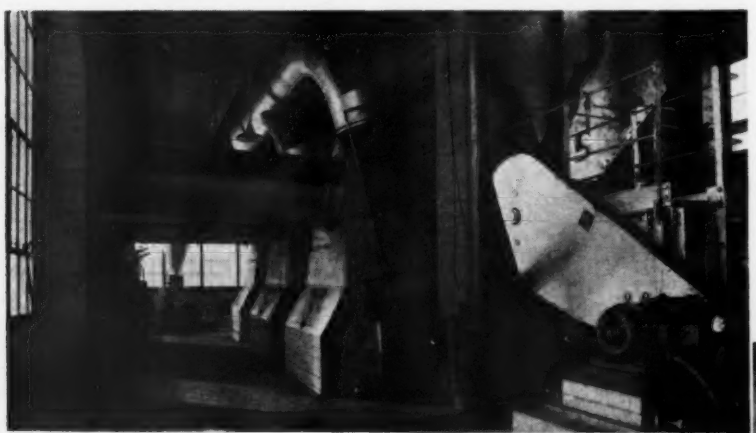
Although a three product separation is usually made with primary Stump air-flow boxes, it was decided in this case to follow the practice used at Negley by the Pittsburgh Coal Company; therefore, the two primary air-flows, each handling a feed of 60 tons per hour, are arranged with a rotary valve take-off for two part separation only—that is, a cleaned coal and a combined middlings-refuse fraction. The cleaned coal is diverted by chutes to the clean coal conveyor for loading with the wet washed coarse coal. The combined middlings-refuse fraction from the two primary air-flows is picked up by the lower strand of the refuse conveyor and delivered to an elevator which raises it to a 20-ton surge bin also equipped with "Bin-Dicators" and directly over a 4-ft. wide air-flow box. The latter is used as a retreatment unit to recover the good coal from the middlings-refuse fraction made by the primary machines.

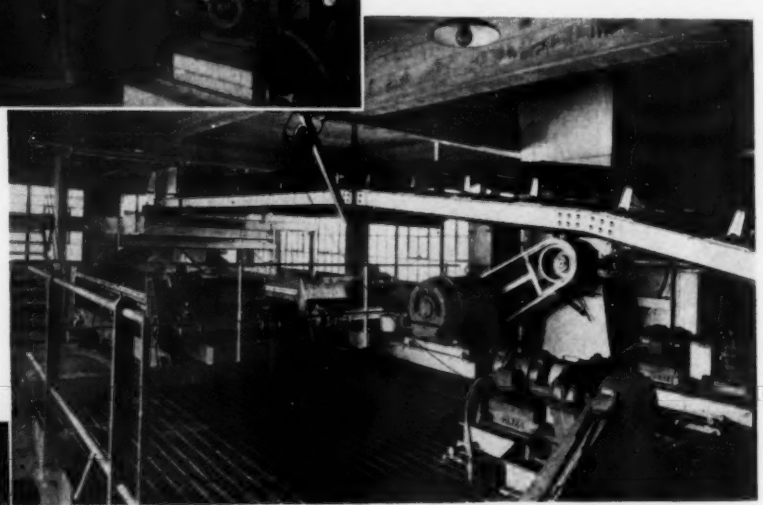
This retreatment box is equipped with two rotary valve take-offs, one for the final refuse which is diverted to the upper strand of the refuse conveyor for final disposal, and the other for middlings which are diverted to the boot of the middlings elevator for recirculation back to this box. The clean coal from the retreatment box is sent to the clean coal conveyor for mixing with that from the primary boxes.

Air Supply

Air to operate the three air-flow cleaners is supplied by a No. 3½ Type W Claridge single-width, single-inlet fan with a capacity of 38,400 c.f.m., 9-in. water gage 1220 r.p.m. The fan is equipped with "Vortex" control for varying volume and pressure, this control giving a large saving in power at reduced volumes as compared with damper control. Air is exhausted from the air-flow boxes and the dust collecting system by a similar No. 3⅞ Claridge fan with "Vortex" control having a capacity of 48,000 c.f.m. at 8-in. water gage.

All dust from the air cleaners and from other sources in the cleaning plant is routed through two 10-ft. diameter cyclones to a 16-ft. wide by 30-ft. long Pangborn cloth collector made up of two No. 56 Type "C J" double cloth screen sections and a 5-ft. by 16-ft. classifier section with 17,920 sq. ft. of cloth for 48,000 c.f.m. The coarser dust (minus 48 mesh) is collected by the cyclones and dropped into a screw conveyor which discharges into either the clean coal or refuse conveyor. The real fine dust is collected by the cloth collector, the air leaving same being entirely free of any dust whatsoever. Rappers are installed on each of the sections of the cloth collector and are





Above—Air flow cleaning units for fine coal and one re-treating unit for middlings and refuse. Hydro-separators shown upper right.

Right—Belt conveyor from tipple, and raw coal sizing screens on top floor of plant

Below—Fine coal draining screens for washed coal. Coarse coal dewatering and sizing screens on floor immediately above

started once or twice a day to shake the dust down out of the cloth bags into the hoppers beneath. From these hoppers the dust feeds into two small screw conveyors which convey it to a main dust screw conveyor, for delivery either to the clean coal or refuse conveyor. Chutes from the dust screw conveyors are fitted with motor-operated rotary valves to prevent short-circuiting the collecting system when running dust.

Complete Water Gage System

To facilitate plant operation and adjustment, a complete system of water gages is installed to indicate the distribution of air to the various plant units. Lines are tapped into the plenum chamber ahead of the air-flow boxes, under and over each box, in the risers to the cyclones, in the inlet and outlet of each cyclone, the inlet and outlet of each dust collector and in the inlet to the exhaust fan.

In addition to the collecting system, elimination of dust involved the enclosing of conveyors, raw coal screens, chutes, air-flows and other equipment to prevent its escape. Welded joints were installed where possible, but where bolted joints were necessary, usually where equipment might have to be opened, the joints were pitched or fitted with rubber gaskets. Rubber, for example, was used around the inspection or sampling doors of the air-flow boxes and in other places frequently subject to opening.

Wet Process Described

The two sizes of coarse coal, namely the 4-in. by 1-in. and 1-in. by 5/16-in. made by the double deck vibrating screens at the top of the plant are washed separately in two improved 42-in. wide single Tandem Hydro-Separators. In each case the raw coal is delivered from the vibrating screens to an 8-ft. long trough ahead of the hydro unit, and is sluiced into it with water which tends to stratify the refuse from the coal even before it reaches the cleaning unit. Each hydro unit has two cells, a primary cell and a secondary or rewash cell. Continuous separation is obtained with continuous coal and refuse discharge with full automatic control and the absence of moving parts in the separating cells. The refuse from the primary cells is always free from coal, and is therefore sent direct to the refuse conveyor. Refuse from the rewash cells is considered middlings, and is returned to the feed for rewashing to recover additional coal; however, the hydros are arranged so that the rewash cell refuse can be thrown direct to the refuse conveyor if so desired.

After these coarse sizes are washed separately they are sluiced together to a high speed Parrish-type washed coal shaker screen 6-ft. wide by 32-ft. long operating at 150 4½-in. strokes per minute. This screen consists of two decks. The top one is equipped with 1-in. screen plate and carries the 4-in. by 1-in. coal. The lower deck is equipped with ¼-in. screen plate and carries the 1-in. by 5/16-in. coal to its front end whence it is diverted to two 4-ft. by 14-ft. single deck vibrating screens located directly under the big Parrish-type screen. These extra dewatering screens are inclined slightly upward and are dressed with very fine wire cloth; they do an excellent job of further dewatering the 1-in. by 5/16-in. washed coal. From the draining screens the washed 4-in. by 1-in. and the 1-in. by 5/16-in. coal is delivered to the clean coal conveyor to be loaded on either of the two loading tracks with the air-cleaned minus 5/16-in. coal.

The wash water from the draining screens flows to the back end of a 40,000 gal. reinforced concrete sludge tank into which the fines are settled out. This settling tank is equipped with a three-cornered sludge conveyor 6-ft. wide with 6-in. channel flights operating at 20 f.p.m. Length between centers is 70 ft. and dewatering to about 18 percent moisture is done on a 30 degree inclined section. The sludge conveyor delivers the sludge to a screw conveyor from which it may be diverted to either the clean coal or to the refuse conveyor.

At the front end of the sludge tank and connected thereto is a pump tank to receive the overflow water which is pumped to the hydro-separators by four 2,000 gal. p.m. 8-in. by 10-in. single stage double suction bronze-fitted Warren centrifugal pumps, one for each cell. A smaller pump of the same type is used to supply water for the raw coal sluices ahead of the hydros. Make-up water for the plant is obtained by gravity from a 50,000 gal. storage tank of wood construction located near the plant. This water usually runs about 20 gals. p.m. and is added intermittently to the water in the sludge tank.

The refuse from the Hydro-Separators as well as that from the Stump air-flow boxes is conveyed back to a point in the tipple where it unites with the lump pickings and is conveyed up to a 100-ton capacity bin whence it is disposed of by an electric lorry and finally by an aerial tramway.

Added Precaution Against Dust

As an extra precaution against any dust that might escape in the tipple, in the mixing bin structure or in the cleaning plant proper, a vacuum sweeping system has been added. A rotary exhauster pulls the dust into the system and passes it to two collectors, one primary and one secondary, the secondary including cloth tubes for final settlement of the dust. A trap ahead of the primary collector takes out any metal scraps, chunks of coal or rock, or other pieces of hard material small enough to go through the attachment nozzles. Attachments embrace types for cleaning not only floors, but also walls, machinery, beams, piping and other spots where dust might collect. Dust reclaimed in the collectors drops into the raw coal conveyor leading to the cleaning plant.

The entire plant is heated by steam from the central boiler plant through unit heaters placed conveniently throughout the plant.

Results Have Been Gratifying

The technical cleaning results at Mather have been highly gratifying, as they have been most consistent from the very start of the plant and even better than the one thousand tons Negley test would indicate. A raw coal that has run as high as 10 percent ash and 1.55 percent sulphur has been consistently cleaned to 6.75 percent ash and 1.20 sulphur in the cleaned coal, with very little loss of coal in the refuse which, in most cases, has been of undesirable high ash content. The ash in the refuse from the entire plant has been consistently over 57 percent and from the air cleaning plant in particular over 62 percent.

The question of moisture in the final clean coal product was also of much concern to the management, since the distances which the coal is shipped make freight costs important. With the dry cleaning of the fines and the extra draining of the smaller wet washed sizes on vibrating screens the plant is able to ship consistently a product with less than 4 percent moisture, which is far lower than any other washing plant in the Pittsburgh field that doesn't have expensive heat dryers.

This modern, efficient and, we might say, inexpensive plant is the result of careful efforts of the management, with the able assistance in both the design and construction of the plant by V. D. Hanson, assistant preparation engineer of the Pittsburgh Coal Company.

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Site of dam showing excavation for power house. Shaft was sunk from spot on surface directly over tunnel, portal of which is shown in hill cut at center above—Waste from shaft and tunnel being used to fill coffer drain

Sinking a 103-Foot Shaft by Unique Method

● ***Four-Foot Shaft Formed By Shooting Out Five Drill Holes Enlarged to Desired Size in Record Time***

By F. W. EVANS
Shaft and Tunnel Contractor
Picher, Okla.

THE Grand River Dam in northeastern Oklahoma is no longer a dream but is fast becoming a reality, and sometime in the latter part of 1940 or the early part of 1941 it is expected to be completed. A vast body of water covering 52,000 acres will be formed, and around its 1,300 miles of shoreline it is estimated 1,000,000 visitors annually will begin enjoying its shores and waters for fishing, boating, swimming and hunting.

For many years this dam has been a dream of the residents of Oklahoma, but only a few years back through the untiring efforts of Congressman Wesley E. Disney was it given serious consideration by government authorities. Government engineers worked almost two years before definite plans were made and $20,000,000 appropriated by the United States government and the state of Oklahoma for its construction, which began in the latter part of 1938. The dam will be built entirely of reinforced concrete, and when completed it will be 150 ft. in height, 6,500 ft. in length and will have a 60 foot-wide roadway across its top. There is a proposal at present to increase the height of the dam 5 ft., and if this is done it will increase the flooded area by about 5,000 acres and the shoreline by approximately 250 miles.

At the extreme eastern end of the dam is the city of Tia Juana which overlooks both the spillways and lake proper. In the center on an island is the city of Disney, named after the congressman who was responsible for the construction of the dam. On the west end is the city of Langley, located on a bluff approximately 150 ft. high at the foot of which the power house will be constructed.

It was through this bluff that a most unique method was used in sinking a shaft and driving a tunnel through solid rock. The shaft and tunnel are to be used in the installation of all power equipment and transmission lines from the power house to the surface; later an elevator will be installed so the public may visit the power plant after it is put in operation.

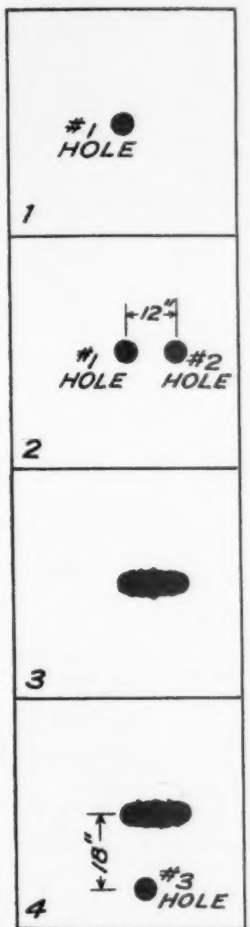
Construction Work Precluded Use of Customary Shaft Sinking Method

It was originally planned to sink the shaft 103 ft. deep, 11-ft. by 12-ft. in the clear, by the usual method of drilling, blasting and mucking by hand, the

waste rock to be hoisted, dumped in trucks and hauled away for disposal. The 14-ft. by 16-ft. tunnel was then to be driven out to the face of the bluff about 30 ft. above the river bed by the same method. However, due to construction work on the electric switch yards, and other work being carried on close to the shaft site, the blasting was considered dangerous. Plans were changed, therefore, and it was decided to begin work at the entrance to the tunnel in the face of the bluff, drive the tunnel first, then drive a small raise in the center of the shaft proper to the surface, then sink the shaft to proper size, disposing of the waste rock by dropping it down through the small raise into the tunnel.

A 7-ft. by 8-ft. pilot tunnel at the top of the tunnel proper was started in the face of the bluff about 30 ft. above the river level, mucking being done by using an Ingersoll-Rand double drum air-driven slusher hoist with a ½ yd. slusher bucket, but when the lower section of the tunnel was started, a Bucyrus-Erie bulldozer was used by backing in the tunnel and pushing the waste out. This required only a few minutes, as the bulldozer blade was almost as wide as the tunnel and the waste was pushed to the tunnel entrance and rolled down the bottom 30 ft. of the bluff. Ingersoll-Rand N 75 drills and jack bits were used for the drilling.

Plan sketches showing development of shaft opening by shooting out drill holes



8" hole in center of 11' x 12' shaft location

Holes No. 1 and 2 before shooting

Holes No. 1 and 2 after shooting

Hole No. 3 before shooting

Holes Drilled for Cableway and Ventilation

A Keystone churn drill was moved on to the shaft site on top of the bluff, and an 8-in. drill hole started in the center of the proposed shaft at the same time the tunnel was started from the face of the bluff. This drill hole was to be used for a cableway from a hoist on the surface to lift the drillers, drills, etc., up to their work in the raise in the proposed shaft after the tunnel was driven under it.

A close comparison of the rock formation in the drill hole and the face of the bluff showed them to be almost identical, namely a porous, rather soft white limestone with 6-in. to 8-in. layers of blue flint occurring about every 5 to 6 ft.

The 8-in. churn drill hole was completed in about 36 hours, and by placing a flash light in the bottom of the hole and using a plumb line it was found that the hole was almost perfectly straight, which is very unusual as a churn drill hole will usually vary several feet from top to bottom due to various formations encountered. As the drilling was so easy, the contractor decided to drill another hole for ventilation, a blower to be installed on same at the surface. This hole was located 12 in. from hole No. 1 and was also found to be straight. It was then decided to try an experiment that afterwards proved to be a success.

Experiment in Shooting Out Holes a Success

A shot (or cartridge) 83 ft. long was made up by tying 4 sticks of Illinois Gold Medal 30 percent dynamite around a rope at 8-in. intervals, making a solid shot. The object in tying the dynamite around the rope was to enable its being pulled out in case it choked the hole going down. This shot was then lowered into drill hole No. 2 and river sand was sifted into the hole as tamping. The last 20 ft. of the hole was solid sand, as the shot was left 20 ft. below the top of the hole to avoid damage to nearby structures. When fired, only a small amount of the sand came to the surface. Considerable care was taken not to use too heavy a shot as there was a severe penalty for overbreak in the contract.

After shooting hole No. 2 the churn drill was again placed over drill hole No. 1, and by drilling and bailing, the hole was cleaned to the bottom. The same was done to hole No. 2, and on lowering an electric light into the holes it was found that the shot had broken the lime formation cleanly, but that the hard flint seams were still between the two holes. However, these were easily broken out by placing a large bit on the drill stem and drilling between the holes. Had the No. 2 hole been loaded more heavily it is believed these seams would have been broken by the first shot.

New Plan Adopted

On finding the holes would break in this manner, and with an opening some

Holes No. 1, 2 and 3 after shooting

Hole No. 4 before shooting

Holes No. 1, 2, 3 and 4 after shooting

Hole No. 5 before shooting

Plan of rough 4-ft. shaft after shooting 5 holes

24 in. in size to break to, three more churn drill holes were drilled (see sketches). The first or No. 3 hole was located 18 in. from the opening made by the junction of No. 1 and No. 2, approximately 2 ft. long and 8 in. wide; another hole (No. 4) was drilled, 24 in. from the cut made by No. 1 and No. 2 and in line with them; and another hole (No. 5) was drilled 24 in. from No. 1 and No. 2 and opposite No. 3.

The last three holes were not shot until the tunnel had been driven under the shaft and a 21-ft. by 21-ft. room (which was required by the contract) was completed. Hole No. 3 was shot by the same method used on No. 2, but about 20 percent more dynamite was used and the hole was loaded within 10 ft. of the surface. This hole broke clean, and all the rock broken dropped into the tunnel below. Holes No. 4 and No. 5 were loaded the same as No. 3, were fired in order, and both broke clean. The result was a small shaft about 48 in. in diameter in the center of the ground to be occupied by the 11-ft. by 12-ft. shaft.

The mucking in the tunnel at the bottom of the shaft was not difficult, as the drag lines, sheaves, etc. were put in place before firing No. 3 hole. However, when holes No. 4 and No. 5 were shot the small shaft choked at 80 ft. Efforts were made to unchoke the shaft by pounding from the surface with the drill tools, but this only seemed to pack the waste tighter. By shooting a few sticks of dynamite against it from below, however, it was soon loosened and the opening cleaned from top to bottom. As stated above, this gave a small open shaft from the surface to the tunnel below, the few feet not loaded at the surface having been so shattered that this ground also fell with the rest of the waste.

Enlarging the Shaft

The shaft proper was then started by drilling 6-ft. jackhammer holes with Gardner-Denver jackhammers around the small shaft in the center, and 5-ft. holes in the sides and corners. The 6-ft. holes were fired first thus giving a funnel shape to the center of the shaft through which all waste dropped into the tunnel where mucking with the slusher was carried on. The shaft was easily trimmed to proper size as it was put down. There was no overbreak, as no heavy blasting was required due to having the larger opening to break to in the center of the shaft. The shaft was completed the full 103 ft. in 84 working hours after the drill holes were shot, this having been made possible by the ready disposal of broken rock. In fact, the work progressed so fast that no hoist was installed; the drill rig already on the shaft was used as a hoist, the drill tools being detached and a Tri-State bucket used for handling the men and tools.

The muck or waste rock was used to fill the coffer dam after the shaft and tunnel were finished. Construction of the coffer dam was necessitated in building the power house; when this is finished it will be used to build a scenic drive for about a mile along the bluff.

In the planning of the work it was expected that ventilation in the tunnel would be quite a problem, as there was no electric power available for blowers. However, the air current coming down the river seemed to strike the face of the bluff and forced the air out of the tunnel, only a few minutes being required for the smoke to clear out after the shots. After the drill holes in the shaft were shot, the draft was so strong it was necessary to shut a part of it off.

This work was engineered and supervised by the author, a shaft and tunnel contractor of Picher, Okla., who was paid by the yard. In conclusion, I believe this is the first time on record that a shaft was put down by this method; but I also claim that it would not work one time in a thousand.

Accident Rate at Iron and Copper Mines Reduced in 1938

Notable lowering of accident rates at iron and copper mines in the United States during 1938 were recently reported by the Bureau of Mines, U. S. Department of the Interior, based on reports from operating companies to that agency. The reports covered all producing mines, underground and open pit, and relate only to mining operations; beneficiating plants, concentrators or any type of ore-dressing were not included.

From 1935 to 1937 the accident rate at iron-ore mines rose from 18.7 to 30.8 per million man-hours. However, in 1938 the rate fell further to 16.7, representing a drop of almost 50 percent from the previous year. The improvement was general throughout the industry. Not only did separate comparisons of underground, open-pit, and surface operations show declines, but also all of the important producing states had better accident records in 1938.

Volume of employment in iron ore mines, as shown by number of man-hours worked, declined in greater proportion than the number of men employed, as the average number of days of employment available to each man dropped from 249 in 1937, to 197 in 1938, although the average length of the workday remained the same. The number of man-hours worked fell by 38 percent, and the number of men employed by only 22 percent.

The most important causes of accidents at underground mines during 1938 were falls of rock or ore from the roof or wall, haulage, handling materials (other than rock or ore), machinery, and drilling. At open-pit mines the most important causes were handling materials, falls of persons, hand tools, and machinery. Falls of rock or ore from the roof or wall accounted for about one-fifth of all the accidents underground, and handling materials accounted for about the same proportion of the open-pit accidents.

Copper mines lowered the high accident rate of 95.94 of 1937, to 61.28 in 1938, the lowest accident rate experienced by copper mines since 1934. The number of men employed at the mines was 17,582, a decrease from the previous year's figure, but an increase over 1936. Due to a drop in average days of labor per man per year (309 in 1936 and 307 in 1937, to 246 in 1938), the total number of man-shifts and man-hours worked was less in 1938 than in the other two years. Open-pit mines maintained a gain over 1936 in man-shifts and man-hours, as opposed to a loss in these items in underground mines. Figures for 1937 recorded the highest employment in the industry since 1930.

Accidents at copper mines during 1938 killed 24 and injured 2,098 men. Fall of ground caused the largest number of the accidents in underground mines, although handling materials, haulage, and hand tools were frequent causes of accidents. The same causes, as well as falls of persons, were prominent in open-pit mining, but the accident rate was lower in that form of mining, paralleling the accident rate for surface work very closely. No major disasters (accidents in which five or more men were killed) occurred in 1938.

Little significance attaches to the decline in number of companies and mines in 1938 from 1937. The survey of the industry covered more one-man and two-men mines in 1937 than in 1938, but the exclusion of the small operations in 1938 changed the employment picture for the total industry very slightly.

Since organization of the Mining Extension Department of West Virginia University in 1913, a total of 29,133 men have attended the night classes in coal mining, and 1,794 men have attended the annual short courses. The 27th annual short course in coal mining was held by the department June 5 to July 15 at Morgantown, Beckley and Logan, W. Va.

Welcome to Salt Lake City

● *6th Annual Metal Mining Convention and Exposition of the American Mining Congress, Western Division*

"SEE you in Salt Lake at the A. M. C. convention." These words are being uttered throughout the metal mining areas of the West and in other mining centers all over the country, as final plans are pushed to conclusion for the 6th Annual Metal Mining Convention and Exposition of the American Mining Congress, Western Division, in Salt Lake City, Utah, August 28 to 31.

An A-1 program of addresses on subjects of deep significance to mining—a dazzling display of latest developments in mine equipment and supplies, with pregnant ideas from manufacturers that will pay dividends—and a corking fine bill of entertainment; these are the ace attractions that are on tap at Salt Lake, arranged for your education and enjoyment by hundreds of mining men under the leadership of George Rupp, national chairman of the Program Committee, and James W. Wade, chairman of the General Arrangements Committee, with the active support and guidance of D. D. Moffat, chairman of the Board of Governors of the Western Division, American Mining Congress; and Howard I. Young, president of the American Mining Congress.

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YOUR H
AT T
CONVEN

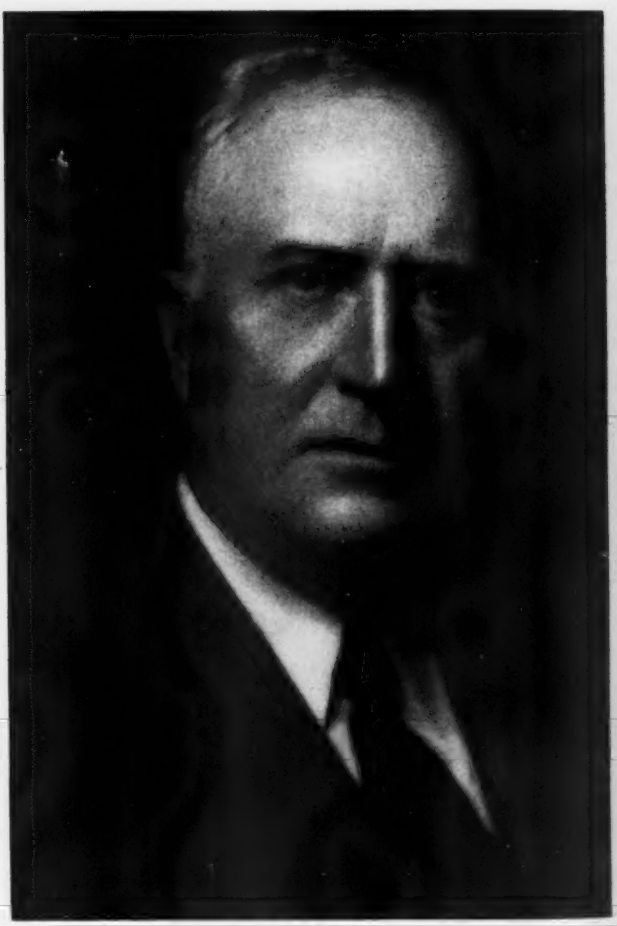
Mr. Young is President of the American Mining Congress

Mr. Moffat is Chairman of the Board of Governors, Western Division, and Vice President of the American Mining Congress

HOWARD I. YOUNG
President, American Zinc, Lead & Smelting Co.

Mascot Mine of American Zinc Co. of Tennessee

Bingham pit of Utah Copper Company



D. D. MOFFAT
Vice President, Utah Copper Co.

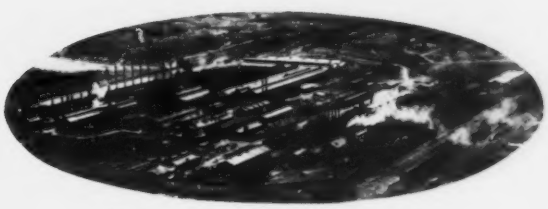
HOSTS THE NTION

Mr. Rupp is National Chairman of the Convention Program Committee

Mr. Wade is Chairman of the General Arrangements Committee

JAMES W. WADE
Vice President, Tintic Standard Mining Co.

GEORGE RUPP
Manager, Mining Dept., Colorado Fuel & Iron Corp.



Minnequa plant of Colorado Fuel & Iron Corp. at Pueblo

Shaft and surface plant of Eureka Standard in the Tintic District

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Program

Colorado

ROBT. H. SAYRE
Veta Mines Corp.

Idaho

H. G. WASHBURN
Federal M. & S. Co.

New Mexico

HORACE MOSES
Nevada Cons. Copper Corp.

Washington

D. I. HAYES
Am. Z. L. & S. Co.

California

ERROL MacBOYLE
Idaho-Md. Mines Corp.

Central and Eastern States

W. R. DICE
Eagle-Picher Lead Co.

Alaska

W. A. CASTLETON
Castleton & Keenan

Arizona

JOS. W. WALTON
Hillside Mines, Inc.

State Chairmen and

Alaska

H. L. FAULKNER
Faulkner & Banfield
LEWIS A. LEVENSALER
Seattle, Wash.
J. D. LITTLEPAGE
Chichagoff Mining Co.
FRANK O'FARRELL
Alaska Miners Assn.
ERNEST N. PATTY
Gold Placers, Inc.
JAMES S. ROBBINS
Arctic Circle Exploration, Inc.

Arizona

W. O. BROADGATE
Prescott
J. S. COUPAL
Department of Mineral Resources
M. CURLEY
Phelps Dodge Corp.
WILLIAM KOERNER
Magma Copper Co.
ALBERT I. LONG
Ajo
MILES W. MERRILL
Bisbee
HUGO W. MILLER
Miller's Assay Office
FOSTER S. NAETHING
Mammoth-St. Anthony, Ltd.
EDISON THACKER
Squaw Peak Copper Mining Co.
ROBERT W. THOMAS
Nevada Cons. Copper Corp.
FRANK A. WARDLAW, JR.
Inspiration Cons. Copper Co.
CHAS. F. WILLIS
Arizona Small Mine Opers. Assn.

California

WORTHEN BRADLEY
Bradley Mining Co.
G. CHESTER BROWN
Calif. Metal & Mineral Prod. Assn.
WALTER LYMAN BROWN
Knob Hill Mines, Inc.
W. C. BROWNING
Golden Queen Mining Co.
A. B. CAMPBELL
Pacific Coast Borax Co.
E. B. DEGOLIA
Camanche Gold Dredging Co.
GEORGE W. HALLOCK
Sixteen-to-One Extension Gold Mines, Inc.
VICTOR J. HAYEK
Mining Assn. of the Southwest
ALBERT F. KNORP
Gold Producers of California
ROBERT LINTON
Los Angeles
ALEX ROSS
Argonaut Mining Co., Ltd.
F. C. VAN DEINSE
Yuba Consolidated Gold Fields

Central and Eastern States

J. T. CLAIBORNE, JR.
Freeport Sulphur Co.
HARLEY A. COY
American Zinc Co. of Tennessee
LUCIEN EATON
Milton, Mass.
R. R. ECKERT
U. S. Copper Assn.
ANDREW FLETCHER
St. Joseph Lead Co.
CHESTER A. FULTON
Southern Phosphate Corp.
E. V. GENT
American Zinc Institute
JEAN MCCALLUM
St. Louis Smelting & Refining Co.
RUSSELL B. PAUL
The New Jersey Zinc Co.
W. N. SMITH
Vinegar Hill Zinc Co.
FELIX E. WORMSER
Lead Industries Assn.

Colorado

J. PRICE BRISCOE
Fairplay Gold Mines, Inc.
BLAIR BURWELL
U. S. Vanadium Corp.
SHRIVE B. COLLINS
Colorado Fluorspar Corp.
WILLIAM J. COULTER
Climax Molybdenum Co.
EZRA D. DICKERMAN
Leadville
FRANK L. JONES
Gold Belt Tunnel & Mining Co.
JESSE F. MCDONALD
Denver
F. W. MARCROFT
Colorado Springs
ROBERT S. PALMER
Colorado Chapter, A. M. C.
T. K. SCOTT
Mining Associates, Inc.
H. L. TEDROW
The London Mines & Milling Co.
TROY E. WADE
United Gold Mines Co.
F. D. WILLOUGHBY
Midnight Mining Co.

Idaho

WALTER C. CLARK
Bunker Hill & Sullivan Mining & Conc. Co.
HENRY L. DAY
Hercules Mining Co.
C. A. DYE
Tendoy Copper Queen Syndicate
A. W. FAHRENWALD
University of Idaho
J. W. GWINN
Idaho Mining Association
L. E. HANLEY
Hecla Mining Co.

Committee

Utah

F. S. MULOCK
U. S. S. R. & M. Co.

Oregon

LEVERETT DAVIS
Cornucopia Gold Mines

Lake Superior

E. E. HUNNER
M. A. Hanna Co.

South Dakota

J. D. JOHNSON
Homestake Mng. Co.

Texas

BRENT N. RICKARD
A. S. & R. Co.

Montana

H. C. BACORN
Cable Mining Co.

Nevada

FRED E. GRAY
Desert Silver Inc.

Tri-State

CHAS. A. NEAL
Cardin M. & M. Corp.

Committee Members

Idaho (continued)

W. CHURCH HOLMES
Sunshine Mining Co.
E. M. NORRIS
Anaconda Copper Mining Co.
HARRY P. PEARSON
Silver Summit Mining Co.
IRVIN E. ROCKWELL
Minnie Moore Mine
NEAL SNYDER
Snyder Mines, Inc.

Lake Superior

A. D. CHISHOLM
Pickands Mather & Co.
S. R. ELLIOTT
The Cleveland-Cliffs Iron Co.
M. D. HARBAUGH
Lake Superior Iron Ore Assn.
E. J. MANEY
Snyder Mining Co.
O. M. SCHAUS
Montreal Mining Co.
GEORGE P. SCHUBERT
Copper Range Co.
HARRY VIVIAN
Calumet & Hecla Cons. Copper Co.

Montana

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Madison County Mining Assn.
LYMAN H. BROOKS, JR.
Gilt Edge Mining Corp.
GUST CARLSON
Montana Consolidated Mines Corp.
R. B. CASWELL
Ermont Mines
C. G. CRANE
Mineral Belt Mining Assn.
WM. B. DALY
Anaconda Copper Mining Co.
ALEXANDER LEGGAT
Butte
J. D. MACKENZIE
American Smelting & Refining Co.
FRANCIS A. THOMSON
Montana School of Mines
CARL J. TRAUERMAN
Mining Assn. of Montana
P. A. WICKHAM
Little Ben Mining Co.
A. E. WIGGIN
Anaconda Copper Mining Co.

Nevada

L. D. GORDON
Penelas Mining Co.
J. B. HAFFNER
Consolidated Copper Mines Corp.
OTT F. HEIZER
Nevada-Massachusetts Co.
H. A. JOHNSON
Tonopah Mining Co. of Nevada
J. C. KINNEAR
Nevada Cons. Copper Corp.
ROBT. P. RASKOB
Raskob Mining Interests, Inc.
HENRY M. RIVES
Nevada Mine Operators Assn.

New Mexico

T. D. BENJOVSKY
Peerless Mine
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U. S. Potash Co.
K. K. HOOD
Callahan Zinc-Lead Co.
ROBERT M. MAGRAW
Potash Co. of America
J. T. MATSON
American Metal Co. of New Mexico
J. F. WOODBURY
New Mexico Chapter, A. M. C.
IRA L. WRIGHT
Black Hawk Cons. Mines Co.

Oregon

D. FORD MCCORMICK
Medford
F. WHALLEY WATSON
Oregon Mining Association

South Dakota

C. E. DAWSON
Bald Mountain Mining Co.

Texas

JOHN G. BARRY
El Paso
H. P. HENDERSON
New York City
J. C. HUNTER
Gregg Oil Co.
H. E. TREICHLER
Texas Gulf Sulphur Co.

Tri-State

C. A. BECK
Beck Mining & Royalty Co.
EVAN JUST
Tri-State Zinc & Lead Ore Prod. Assn.
GEO. W. POTTER
Eagle-Picher Mining & Smelting Co.
H. H. UTLEY
St. Louis Smelting & Refining Co.

Utah

J. O. ELTON
International Smelting & Refining Co.
OSCAR N. FRIENDLY
Park Utah Cons. Mines Co.
JAMES IVERS
Silver King Coalition Mines Co.
C. T. KEIGLEY
Columbia Steel Co.
A. G. MACKENZIE
Utah Chapter, A. M. C.
D. D. MOFFAT
Utah Copper Co.
W. J. O'CONNOR
American Smelting & Refining Co.
JAMES W. WADE
Tintic Standard Mining Co.
GLOYD M. WILES
Park City Cons. Mines Co.

Washington

C. P. BROWNING
Howe Sound Co.
HUGH BROWN
Washington State Chamber of Mines
THOMAS B. HILL
State Dept. of Conservation and Development
E. GEORGE HOWE
Tacoma
JENS JENSEN
Pend Oreille Mines & Metals Co.
ROGER O. OSCARSON
Northwest Mining Assn.
MILNOR ROBERTS
University of Washington
M. H. VAN NUYS
West Coast Mineral Association

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OSCAR N. FRIENDLY

James W. Wade, General Chairman

WM. J. O'CONNOR

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E. W. Engleman
E. A. Hamilton
Merle G. Heitzman
James Ivers
C. T. Keigley
D. D. Moffat
J. A. Norden
W. J. O'Connor
M. D. Paine
B. L. Sackett
J. D. Shilling
Geo. W. Snyder

LAWRENCE FOX

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Lawrence Fox, *Chairman*

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J. D. Harlan
Tom Lyon
Leland A. Walker

Saltair Subcommittee

C. T. Keigley, *Chairman*
Nelson Aldrich
Louis Buchman
Paul Hunt
George Snyder

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James Ivers, *Chairman*
James T. Brennan
Wm. F. Koch
A. Soderberg

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Fred W. Hansen
M. G. Heitzman
E. G. Jensen
C. T. Keigley
R. W. Senger
Robert Wallace

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Alfred Frank
Frank M. Gray
J. Fred Johnson
Duncan McVichie
J. A. Norden
Rudy Orlob
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Roy Hatch
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A. C. Moore
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G. W. SNYDER

M. D. PAINE

GLOYD M. WILES

C. T. KEIGLEY

JAMES IVERS

J. O. ELTON

J. D. SHILLING

BE ON HAND AT THESE IMPORTANT SESSIONS

From the opening gavel on Monday morning through the final curtain Thursday afternoon there'll be a wealth of headline news issuing from the daily sessions at the Minerals Building on the State Fair Grouds. National leaders in their respective fields will give you the "last word" on subjects vitally affecting present day mining—including economic, legislative, operating, fiscal and health problems—with lots of lively discussion from the floor in which you are invited to participate.

Perusal of the complete program on pages 38 and 39 attests to the excellent work done by program committee members shown on pages 34 and 35, under the leadership of George Rupp.

It will be noted that the eight sessions will be devoted to discussion of the following general subjects: Minerals and National Defense—Development of Domestic Resources, Monday morning; Prospects for the Metals, Monday afternoon; Operating Progress, Tuesday morning; Labor Problems, Tuesday afternoon; Health Problems in Mining, Wednesday morning; Tariff, and Mine Financing, Wednesday afternoon; Taxation, Thursday morning; and Wage-Hour Act, Thursday afternoon.

A glance will show the high caliber of mining leaders and men in official circles scheduled to lead these discussions, the latter including such high government legislators and responsible administrators as Senator Elbert D. Thomas, of Utah; Senator Wm. H. King, of Utah; Senator Key Pittman, of Nevada; Senator Burton K. Wheeler, of Montana; John W. Finch, director of U. S. Bureau of Mines; D. F. Hewett, chief of metalliferous deposits for U. S. Geological Survey; Edgar B. Brossard, member of the U. S. Tariff Commission; Thomas N. Tarleau, legislative counsel of the U. S. Treasury Department; and Elmer F. Andrews, administrator of the Wage-Hour Division, U. S. Labor Department.

An important function of the meeting, tying in closely with the program, is the formulation of a Declaration of Policy—a concise statement of the considered views of the metal mining industry on vital economic and social questions facing it today. Following submission of proposed resolutions by delegates to the convention and careful deliberation by the Resolutions

A. G. MACKENZIE
Secretary, Utah Chapter
American Mining Congress

JULIAN D. CONOVER
Secretary
American Mining Congress

Board of Governors

WESTERN DIVISION, AMERICAN MINING CONGRESS

D. D. MOFFAT, Chairman
Vice-President, Utah Copper Company

ROY EARLING	Fairbanks Exploration Company
P. R. BRADLEY	Alaska Juneau Gold Mining Co.
P. G. BECKETT	Phelps Dodge Corporation
T. H. O'BRIEN	Inspiration Consolidated Copper Co.
M. CURLEY	Arizona Chapter, A. M. C.
THOMAS McCORMACK	Natomas Company
WORTHEN BRADLEY	Bradley Mining Company
ROBERT LINTON	Consulting Engineer, Los Angeles
W. J. COULTER	Climax Molybdenum Company
GEORGE H. RUPP	Colorado Fuel & Iron Corp.
ROBT. S. PALMER	Colorado Chapter, A. M. C.
LEO J. HOBAN	Hecla Mining Company
A. H. BURROUGHS, JR.	Talache Mines, Inc.
J. W. GWINN	Idaho Mining Association
W. B. DALY	Anaconda Copper Mining Co.
J. D. MACKENZIE	American Smelting & Refining Co.
CARL J. TRAUERMAN	Mining Association of Montana
H. A. JOHNSON	Tonopah Mining Company
J. C. KINNEAR	Nevada Consolidated Copper Corp.
HENRY M. RIVES	Nevada Mine Operators Assn.
HORACE MOSES	Chino Div., Nevada Consolidated Copper Corp.
IRA L. WRIGHT	Black Hawk Consolidated Mines Co.
J. F. WOODBURY	New Mexico Chapter, A. M. C.
G. W. POTTER	Eagle-Picher Mining & Smelting Co.
JOHN A. ROBINSON	Commerce Mining & Royalty Co.
EVAN JUST	Tri-State Zinc & Lead Ore Prod. Assn.
GUY N. BJORGE	Homestake Mining Company
C. E. DAWSON	Bald Mountain Mining Co.
BRENT N. RICKARD	American Smelting & Refining Co.
H. E. TREICHLER	Texas Gulf Sulphur Co.
F. S. MULOCK	U. S. Smelting, Refining & Mining Co.
A. G. MACKENZIE	Utah Chapter, A. M. C.
L. P. LARSEN	Pend Oreille Mines & Metals Co.
C. P. BROWNING	Chelan Division, Howe Sand Co.
ROGER O. OSCARSON	Northwest Mining Association

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MONDAY, AUGUST 28

MORNING SESSION—Minerals and National Defense: Development of Domestic Resources

Chairman: WILLIAM LOACH, Vice Pres. & Gen. Mgr., Wolf Tongue Mng. Co.

STRATEGIC MINERALS LEGISLATION
HON. ELBERT D. THOMAS, U. S. Senator from Utah; Chairman, Military Affairs Subcommittee on Strategic Materials (Tentative)

DEVELOPING DOMESTIC SOURCES OF DEFICIENT MINERALS
HON. JOHN W. FINCH, Dir., U. S. Bureau of Mines
D. F. HEWETT, Chief, Metalliferous Deposits, U. S. Geological Survey

REVIVAL OF HYDRAULIC MINING
GEORGE W. HALLOCK, Pres., Calif. Hydraulic Mining Association.

LUNCHEON AND WELCOME TO DELEGATES

Presiding: JAMES W. WADE, Vice Pres., Tintic Standard Mining Co.

WELCOMING REMARKS:
HON. HENRY H. BLOOD, Governor of Utah
HON. JOHN W. WALLACE, Mayor of Salt Lake City

RESPONSES:
HOWARD I. YOUNG, President, A. M. C.
D. D. MOFFAT, Chairman, Western Division
GEORGE H. RUPP, Chairman, Program Committee
ROY L. COX, Vice Pres., Jeffrey Mfg. Co., representing Manufacturers' Division, A. M. C.

ADDRESS:
HON. WM. H. KING, U. S. Senator from Utah

AFTERNOON SESSION—Prospects for the Metals

Chairman: STANLY A. EASTON, Pres., Bunker Hill & Sullivan Mining & Concentrating Co.

BRIEF RESUMES OF CURRENT STATUS AND OUTLOOK
Copper—P. G. BECKETT, Vice Pres., Phelps Dodge Corp.
Lead—ANDREW FLETCHER, Vice Pres. & Treas., St. Joseph Lead Co.
Zinc—EDWARD H. SNYDER, Gen. Mgr., Combined Metals Reduction Co.
Iron Ore—R. C. ALLEN, Pres., Lake Superior Iron Ore Assn.
Gold—MERRILL E. SHOUP, Pres., Golden Cycle Corp.
Other Metals and Non-Metallic Minerals—CHAS. H. SEGERSTROM, Pres., Nevada-Massachusetts Co.

THE FUTURE OF SILVER
HON. KEY PITTMAN, U. S. Senator from Nevada.

EVENING—Informal Dinner Dance, Salt Lake Country Club

Progr

All Convention and Exposition Activities at Miner

TUESDAY, AUGUST 29

MORNING SESSION—Operating Progress

Chairman: GUY N. BJORGE, Gen. Mgr., Homestake Mining Co.

NEW EQUIPMENT AND IMPROVED PRACTICES IN METAL MINING
LUCIEN EATON, Mng. Engr., Milton, Mass.

THE MORENCI PIT
H. M. LAVENDER, Gen. Mgr., Phelps Dodge Corp.

PROGRESS IN MILLING PRACTICE AND EQUIPMENT
A. W. FAHRENWALD, Dean, School of Mines, University of Idaho

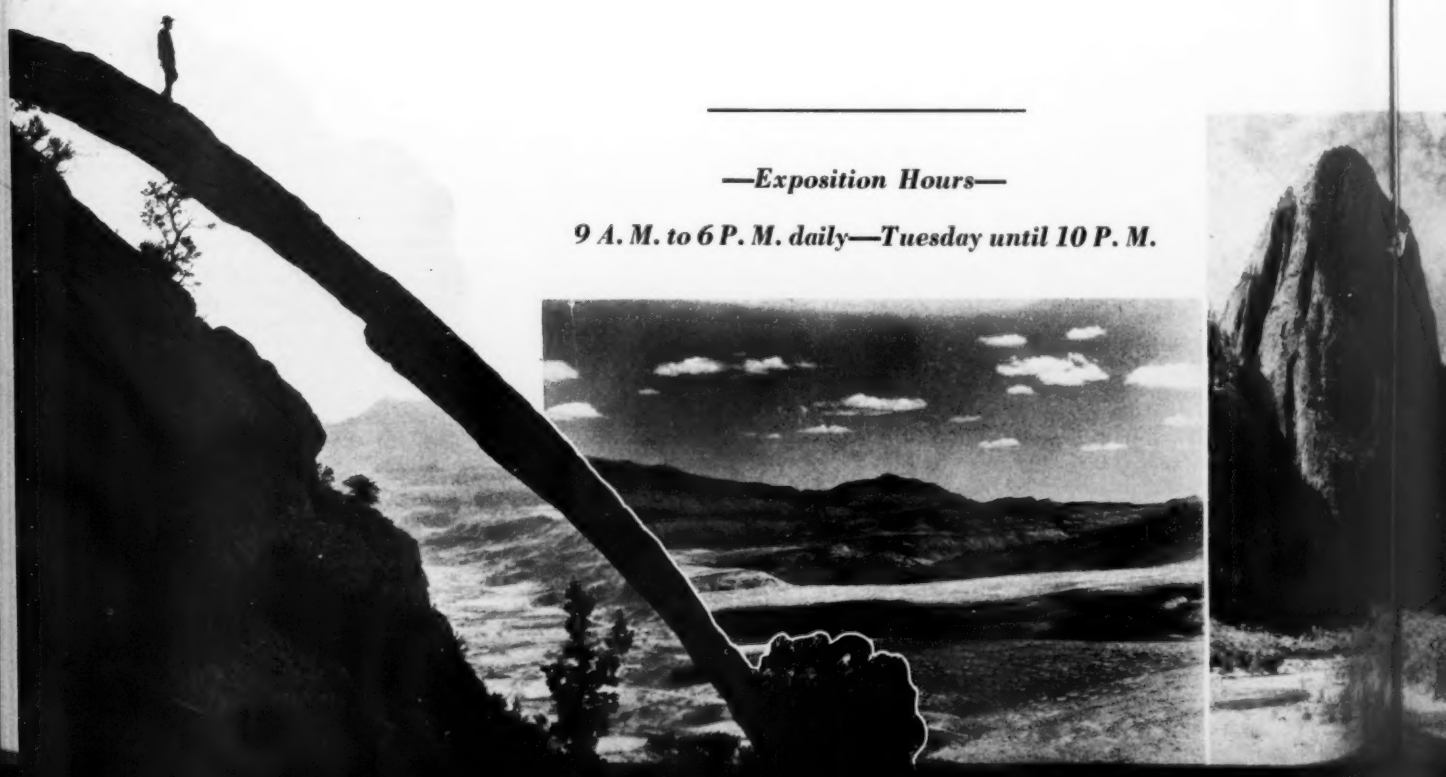
AFTERNOON SESSION—Labor Problems

Chairman: J. C. KINNEAR, Gen. Mgr., Nevada Cons. Copper Corp.

INDUSTRIAL RELATIONS
Speaker to be announced

THE WAGNER ACT AND THE MINING INDUSTRY
DONALD A. CALLAHAN, Wallace, Idaho
Discussion:
HERBERT L. FAULKNER, Counsel, Alaska Miners Association
EDGAR T. ZOOK, Atty., Idaho Maryland Mines Corp.
ROSS D. LEISK, Gen. Mgr., Sunshine Mining Co.
D. P. STRICKLER, Pres., Stratton Cripple Creek Mng. & Development Co.
Representative of Arizona Small Mine Operators Assn.

EVENING—Exposition open until 10 P. M.



—Exposition Hours—

9 A. M. to 6 P. M. daily—Tuesday until 10 P. M.

...ram

...ities at Minerals Building on the State Fair Grounds.

WEDNESDAY, AUGUST 30

MORNING SESSION—Health Problems in Mining

Chairman: F. S. MULOCK, Vice Pres. & Gen. Mgr. of Western Operations, U. S. Smelting Refining & Mng. Co.

A CRITICAL REVIEW OF OCCUPATIONAL DISEASE LEGISLATION
THEODORE C. WATERS, Attorney at Law, Baltimore, Md.

AIR HYGIENE IN THE MINING INDUSTRY
DR. LEROY U. GARDNER, Dir., Saranac Laboratory

AFTERNOON SESSION—Tariff: Mine Financing

Chairman: J. F. MCCARTHY, Pres., Hecla Mining Co.

EXPERIENCE UNDER THE RECIPROCAL TRADE AGREEMENTS
HON. EDGAR B. BROSSARD, Member, U. S. Tariff Commission
Discussion:
HOWARD HUSTON, Asst. to Pres., American Cyanamid Company
HOWARD I. YOUNG, Pres., American Zinc, Lead & Smelting Co.

THE MINING INVESTOR AND THE PROSPECTOR
Speaker to be announced
Discussion:
S. H. DOLBEAR, Chairman, American Mining Congress Committee for Cooperation with the S. E. C.

FINANCING OF PRIMARY MINING VENTURES
CARL J. TRAUERMAN, Pres., Ruby Gulch Mining Co.
Discussion:
W. C. BROADGATE, Prescott, Arizona

EVENING—Jamboree, Saltair Pavilion on Great Salt Lake

THURSDAY, AUGUST 31

MORNING SESSION—Taxation

Chairman: HENRY B. FERNALD, Chairman, Executive Tax Committee, American Mining Congress

THE 1939 REVENUE ACT AND WESTERN MINING
NORMAN L. MCLAREN, McLaren, Goode & Company.
Discussion:
LEO J. HOBAN, Secretary, Hecla Mining Co.

TREND OF FEDERAL TAXATION
THOMAS N. TARLEAU, Legislative Counsel, U. S. Treasury Department
Discussion:
ELLSWORTH C. ALVORD, Counsel, American Mining Congress

ECONOMC EFFECT OF PRESENT TAXES ON THE MINING INDUSTRY
W. H. HOOVER, Chief Western Counsel, Anaconda Copper Mng. Co.

AFTERNOON SESSION—Wage-Hour Act

Chairman: D. M. KELLY, Vice Pres., Anaconda Copper Mining Co.

APPLICATION OF THE WAGE-HOUR ACT TO MINING
ELMER F. ANDREWS, Administrator, Wage-Hour Division, U. S. Department of Labor
Discussion:
WM. KOERNER, Gen. Mgr., Magma Copper Company
CHARLES A. CHASE, Gen. Mgr., Shenandoah-Dives Mng. Co.
W. S. WRIGHT, Gen. Supt., Black Hawk Cons. Mines Company
LEWIS P. LARSEN, Pres., Pend Oreille Mines & Metals Company
C. A. DYE, Pres., Tendoy Copper Queen Syndicate
JOS. W. WALTON, Vice Pres., Hillside Mines, Inc.
G. W. JOHNSON, Mgr., Tri-State Operations, American Zinc, Lead & Smelting Co.
J. B. HAFFNER, Gen. Mgr., Cons. Coppermines Corp.
LEVERETT DAVIS, Vice Pres., Cornucopia Gold Mines

REPORT OF RESOLUTIONS COMMITTEE

EVENING—Annual Banquet, Hotel Utah

Presiding: JAMES IVERS, Vice Pres. and Gen. Mgr., Silver King Coalition Mines Co.

REMARKS:
D. C. JACKLING, Pres., Utah Copper Co. and Nevada Consol. Copper Corp.

ADDRESS:
SENATOR BURTON K. WHEELER, of Montana

GUEST ARTIST:
ALEC TEMPLETON, famous blind pianist, composer and master of improvisation

Enchanting scenic wonders of world fame abound within easy striking distance of Salt Lake City

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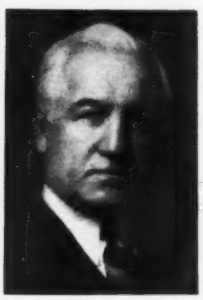
Representing Metal Mining on the Board of Directors, American Mining Congress

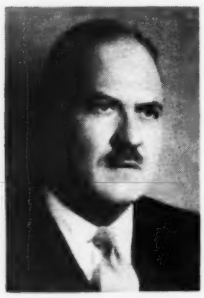
A. E. BENDELARI

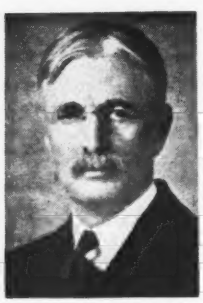
E. B. GREENE

L. S. CATES

CHAS. H. SEGERSTROM


DONALD A. CALLAHAN


MERRILL E. SHOUP


CLINTON H. CRANE

JAS. R. HOBBINS

H. L. PIERCE

Not Shown: N. W. RICE

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GOVERNORS' SILVER CONFERENCE TO FOLLOW CONVENTION

Definite announcement has recently been made by Governor E. P. Carville of Nevada that the second general meeting of the Western Governors' Silver Conference will be held at the Utah Hotel in Salt Lake City at 10 A. M. on the first day following the AMC convention, Friday, September 1. All interested mining men are extended a cordial invitation to attend the conference, and in order to afford everyone this opportunity no trips are being scheduled for that day.

Heading a group of eminent speakers at this meeting, including the Governors of many of the western states, will be Hon. Pat McCarran, U. S. Senator from Nevada. It is anticipated that many of the western Governors will be honored guests at the Annual Banquet immediately preceding the conference on Thursday night.

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Committee such a declaration will be presented to the convention for action on Thursday afternoon.

A joint luncheon meeting of the Board of Governors of the Western Division and the Board of Directors of the American Mining Congress will be held Thursday noon. The Executive Tax Committee of the A. M. C. will hold a noon luncheon meeting on Wednesday.

Assuring an Enjoyable Stay

The General Arrangements Committee, under the leadership of James W. Wade, chairmen and members of which are shown on page 36, has left no stone unturned in completing plans which will assure all visitors a week of genuine pleasure. These men have contributed generously of their time and effort in planning specific functions for the meeting.

Chairman Wm. J. O'Connor and members of his Reception Committee will be on hand throughout the convention to extend a warm welcome to arriving guests.

It is anticipated that Salt Lake City's accommodations may be taxed by the large influx of visitors, but the Hotels Committee, under the leadership of Gloyd M. Wiles, reports that everyone will be well taken care of. A Housing Bureau, operated with the cooperation of the Chamber of Commerce, will be open night and day on the mezzanine floor of the Hotel Utah. *Those without hotel reservations are urged to go directly to this Bureau upon their arrival in Salt Lake in order to obtain the best possible accommodations with a minimum of trouble.*

Important work of educating the newspapers on the value of widespread publicity of convention proceedings in promoting a quickened public consciousness of mining's vital role in the nation's welfare is being ably handled by a committee headed by G. W. Snyder.

Welcoming Luncheon

Guests will receive a rousing and cordial reception to Salt Lake City at Monday noon's welcoming luncheon at the Newhouse Hotel. With James W. Wade presiding, warm greetings will be extended by Utah's Governor Henry H. Blood, and Salt Lake's Mayor John W. Wallace. Responses on behalf of the delegates will be given by Howard I. Young, president of the American Mining Congress;

D. D. Moffat, chairman of the Western Division; George H. Rupp, chairman of the Program Committee; and Roy L. Cox, representing the Manufacturers Division of the A. M. C.

Climaxing this event will be a stirring address by Hon. William H. King, U. S. Senator from Utah, who will doubtless emphasize the vital role mining plays in the prosperity of the western states.

Lawrence Fox is sub-chairman of the Entertainment Committee in charge of the luncheon.

Fun for All and All for Fun

A program of delightful diversion has been arranged for the entire week by the Entertainment Committee chairmanned by Oscar N. Friendly. Functions scheduled for the convention evenings will satisfy the yen to relax after the day's activities, when attractive surroundings and friendly associations will combine with stellar amusement features in a series of events long to be remembered.

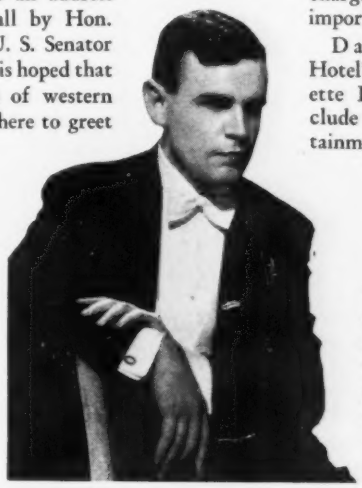
Starting off the evening's entertainment program with a bang will be an informal "get acquainted" party at Salt Lake Country Club Monday night. A buffet dinner will be served on the club's beautiful mountain-fringed terrace, followed by a fine program of varied amusement features presented by Salt Lake's best entertainers. Dancing and hobnobbing under the stars will conclude the festivities. Milton D. Paine is sub-chairman of the Entertainment Committee in charge of this event.

A real treat is in store for everyone Wednesday night at the Jamboree to be staged at Saltair Pavilion on the shores of Great Salt Lake. Opening the fun will be a novel swim in the salt-saturated lake, following which guests will assemble in the specially decorated enclosure underneath the Pavilion for appetizers and a delicious picnic dinner. Dancing will follow on the huge ballroom floor upstairs, and there'll be a sparkling floor show with plenty of zip. Those who can "take it" may add amusement park thrills to features already cited. This entire evening will be cram full of action and fun, and you'll have the time of your life!

C. T. Keigley is sub-chairman of the Entertainment Committee handling the Jamboree.

Alec Templeton to Thrill Guests at the Banquet

Climaxing the activities of convention week on Thursday night will be the annual dinner, to be staged in the spacious lobby and mezzanine floor of the Utah Hotel, beautifully decorated for the occasion. Following a delicious dinner will be an address of vital interest to all by Hon. Burton K. Wheeler, U. S. Senator from Montana, and it is hoped that D. C. Jackling, dean of western mining men, will be there to greet his host of friends with a few remarks. It is anticipated that many Chief Executives of western mining states, in Salt Lake to attend the second general meeting of the Western Governors' Silver Conference, held in conjunction with the convention, will be honored guests at the banquet.



The hundreds in attendance are assured a half hour packed full of thrills with the appearance of Alec Templeton, famous blind pianist, composer and master of improvisation, as guest artist. With unseen spotlights focussed on him, he will present a specially prepared program of varied numbers best qualified to display his marvelous technique and repertory. In the short time since his arrival in the United States he has skyrocketed to the top in the entertainment world, winning concert and radio audiences immediately by his versatile technique at the piano, contagious smile and sparkling sense of humor.

James Ivers, vice president and general manager, Silver King Coalition Mines Company, will serve as toastmaster. He is also sub-chairman of the Entertainment Committee in charge of handling this important event.

Dancing in Utah Hotel's beautiful Lafayette Ballroom will conclude the evening's entertainment.

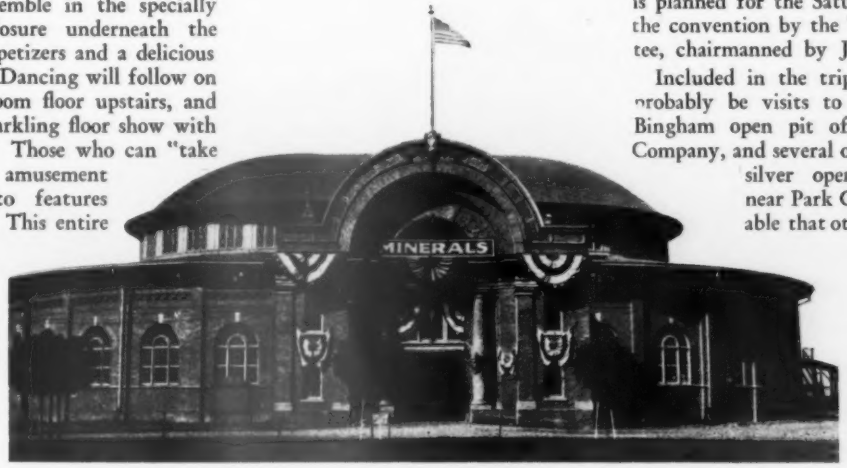
Pleasant Hours for the Ladies

Special entertainment features during the week planned for the constantly increasing number of ladies accompanying their husbands to these meetings, will include an organ recital at Salt Lake's famed Tabernacle, a bridge luncheon at the Country Club, a tea at the country home of Mrs. Oscar Friendly, and sightseeing tours of the romantic and picturesque environs of Salt Lake City. Details of this program will be announced at the meeting.

Trips to Famous Mines

A schedule of visits to many of the world-famed mining and milling operations in and near Salt Lake valley is planned for the Saturday following the convention by the Trips Committee, chairmanned by J. O. Elton.

Included in the trip program will probably be visits to the mammoth Bingham open pit of Utah Copper Company, and several of the renowned silver operations in and near Park City. It is probable that other trips may be scheduled at the time of the meeting, when the specific desires of visitors may be gauged more accurately.



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Exposition Preview

Plenty of Cost-Saving Ideas at the Exposition — A Preview

P. D. McMURRER
Asst. to Secretary, American Mining Congress, who has handled many of the details in connection with the Exposition

PART and parcel of the Salt Lake meeting will be the dazzling display of modern metal mine equipment and supply items assembled in the spacious arena of the Minerals Building by well-known manufacturers from far and near. Exhibits ranging from huge loading and transporting equipment down to small items which play equally vital roles in today's mechanized mining methods will afford mine operators a golden opportunity to carry home cost-cutting ideas.

Nowhere else can you view under one roof up-to-the-minute developments in such varied operating items as: mine locomotives, cars and wheels; track equipment; blasting equipment; loading machines; crushers of various types; pumps; storage batteries; electric shovel control equipment; lubricating oils for mine machinery; slushing scrapers and buckets; wire rope; drill steel; safety devices and personal protective equipment; electric motors and controls; trolley and feeder equipment; arc welders; belt fasteners; dust samplers; pipe couplers, etc. Be sure to get around to each and every booth—a worth while suggestion may be missed if you don't.

Supervising the displays will be expert engineers from the manufacturers who will welcome the opportunity to chat with you on any particularly vexatious operating problems at hand.

The Exposition Committee, chairmanned by J. D. Shilling, has been active in building an exposition which will be a real credit to the mining machinery fraternity.

Space precludes a lengthy preview of the displays that may be seen at the Exposition, but the following description shows some of the items that will be featured. Literature giving full details of individual equipment will be gladly furnished interested parties by the manufacturer, or they may be had by addressing a request to this publication.

• ALLEN-SHERMAN-HOFF COMPANY, THE

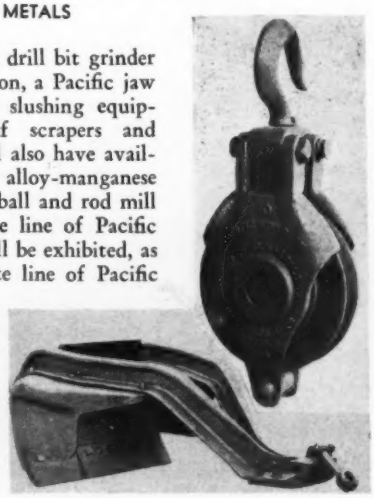
New small size Hydroseal frame pump, with a suction inlet of 1½ in. This pump is close coupled with the motor (motor and pump are all one unit), the overall length being 2 ft. 3 in. This unit will find many applications for handling small quantities of classifier overflow, filter leakage, sump service and tailings disposal.

Also on display will be a cutaway model of an A-frame Hydroseal slurry pump, a quarter section of the metal shell, metal side plates, Maximix rubber shell liner and Maximix rubber side plate liners having been cut out to show the interior construction and the moulded Maximix rubber impaler.

Also shown will be a standard stock slurry pump in the B-frame size. *In charge—William B. Stephenson.*

• ALLOY STEEL AND METALS COMPANY

Pacific detachable drill bit grinder mounted for operation, a Pacific jaw crusher, as well as slushing equipment consisting of scrapers and sheave blocks. Will also have available information on alloy-manganese and alloy-tool steel ball and rod mill lining. Two of the line of Pacific slushing scrapers will be exhibited, as well as the complete line of Pacific sheave blocks.



Important features of the scrapers include manganese steel casting construction, bolted together with standard machine bolts, and all parts being interchangeable so that replacements can be easily made or style of scraper changed. Sheave blocks are arranged so the suspension member swings open to admit the rope without the necessity of threading it through the frame. *In charge—J. M. McKean.*

• AMERICAN STEEL & WIRE COMPANY

See U. S. Steel Corporation Subsidiaries.

• ANACONDA WIRE & CABLE COMPANY

No description received. *In charge—E. A. Casey.*

• ATLAS POWDER COMPANY

Will feature a series of slides on "Ways and Means to Greater Safety." These contain suggestions on priming, wire connections and blasting machine operation, and illustrate three practical ways to test lead wires in the field for breakers or current leakage.

• BETHLEHEM STEEL CO., INC.

Will show the following products: wire rope; operating models of wire rope making machine; forged mine car wheel; manganese frog; 1201 switchstand; reflector target stand; mine ties; bolts and spikes; Mayari R—high strength —corrosion resisting steel; hollow drill steel; abrasion resisting sheets; hot rolled sheets; galvanized roofing and siding; and steel pipe. *In charge—Frank Nickerson.*

• BUCYRUS-ERIE COMPANY

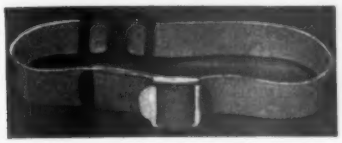
Movies of Bucyrus-Erie mining shovels at work on the Mesabi iron range, the TGO iron mines of Sweden and in other parts of the world. Company will also have a one-quarter size model of the Bucyrus-Armstrong 29-T blast-hole drill displayed in operation.

• BULLARD COMPANY, E. D.

Bullard Tuff-nut hard boiled hat, with interchangeable sweat bands that snap in or out of the crown instantly,

three different sizes of bands being usable in one size crown, thus reducing stock required to assure complete range of head sizes.

Wheat hat lamps, hand lamps and chargers, featuring compact streamlined shape which contributes largely to perfect balance and unusual comfort on the cap or hat. A cord coming from the side allows more head room.



Also complete line of Wilson goggles and respirators, with several new models to be displayed for the first time.

First-aid material on display will include convenient and efficient pocket first-aid packets, larger first-aid kits, and the improved Morenci safety belt, providing greater strength by eliminating belt holes. *In charge—H. M. Holkestad.*

• **BYRON JACKSON COMPANY**

Byron Jackson submersible pump actually operating under water in a glass case, the display unit being smaller than that which may be seen in operation at the Park City Consolidated Mines at Park City, but is identical in design and construction.

Also on display will be company's pneumatic sponge, together with other pumps extensively used for water supply and unwatering operation. *In charge —C. A. Nickerson.*

• **CARD IRON WORKS CO., THE C. S.**

Moving cutouts and replicas of some 50 different types and sizes of ore cars company has built for mines. Also on display will be the "Card" semi-steel heat-treated wheels, showing both design and structural features.

• **CARNEGIE-ILLINOIS STEEL CORP.**

See U. S. Steel Corporation Subsidiaries.

• **COLORADO FUEL & IRON CORP., THE**

No description received.

• **COLUMBIA STEEL CO.**

See U. S. Steel Corporation Subsidiaries.

• **CRANE COMPANY**

No description received.

• **DENVER FIRE CLAY CO., THE**

Oil fired assay furnace and small machines useful in laboratory work. *In charge—Myrl Ray.*

• **DU PONT DE NEMOURS & CO., INC., E. I.**

Gelex type of high explosives used extensively in ore mining throughout the country, with illuminated illustrations of some of the principal mining operations. Also displayed prominently will be recent improvements in company's detonators, with emphasis on wire installation, construction of detonators, and new rubber closure which increases the detonator's water resistance.

Exhibit will also feature a display of Ventube useful in auxiliary ventilation in metal mines. *In charge—A. E. Anderson and R. C. Richards.*

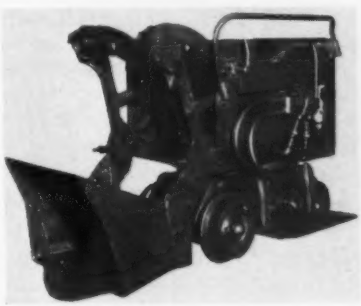
• **EDISON, INC., THOMAS A.**

Edison nickel-iron-alkaline storage battery and Edison electric safety cap lamp for use in metal mines. Several different sizes of Edison cells will be shown with the cell containers cut away to demonstrate the sturdy steel construction of the plates, pole pieces, tubes and pockets which contribute to the long service the battery supplies in mine haulage work. Also on display will be an attractive "nickel flake snowstorm," in which pure nickel flake is blown through a transparent tube to demonstrate its unusual lightness, as well as Edison electric safety cap lamps and Edison miner's hand lamps.

• **EIMCO CORPORATION, THE**

Eimco-Finlay loader models 12-B and 21, equipped with specially designed high speed bucket elevating motors, and new control equipment which permits development of greater power than was the case with previous models.

Also on display will be the Eimco jaw crusher, featuring heavy ribbed electric steel heat-treated frame castings and continuous automatic force feed oil lubrication system, with new sealing rings to prevent oil leakage.



• **ELECTRIC STORAGE BATTERY CO., THE**

Exide-ironclad batteries, showing construction of the positive plates in a number of cutaway cells. Also a complete type ME Exide ironclad in monobloc container, which will enable visitors to see at a glance how the active material of the positive plate is retained in tubes of slotted hard rubber, an important feature in the battery's long life. *In charge—Wm. VanC. Brandt.*

• **ENGINEERING AND MINING JOURNAL**

Free copies of August issue, featuring complete write-up of Bunker Hill and Sullivan Mining Company. *In charge —H. W. Clarke.*

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• GENERAL ELECTRIC COMPANY

Motors, control and air circuit breakers, together with spectacular demonstration direct from company's research laboratory. *Representatives in attendance—E. Bachman, B. C. J. Wheatlake, G. F. Maughmer, J. E. Kempson, M. Rhine, F. A. Rank, W. B. Clark, L. J. Battey, F. H. Doremus, and C. A. Champ.*

• GOODMAN MANUFACTURING COMPANY

Model G-20 shaker conveyor drive with motor mounted and with connecting or drive trough installed. This unit is similar to one being installed by an iron ore mining company on Mesabi Range where, in combination with one of manufacturer's automatic duckbills, it will be used in ore slicing and in conveying the material to the cars. The unit on display has a capacity up to 150 tons, depending on specific gravity of the ore, over a 300-ft. trough line. The duckbill has been arranged to operate at angles up to 75 degrees from either side of the center line.

The Mancha Storage Battery Locomotive Division of the Goodman Company will exhibit Mancha's little trammer, a widely used mining locomotive. It has found extensive use both by big mines in operating profitably in ore bodies previously too lean to pay, and by small mines where other haulage methods were prohibitive. Both the shaker drive and trammer will be operating displays. *In charge—J. D. James.*

• HERCULES POWDER COMPANY

Full-colored Kodachrome motion picture entitled "Making Better Explosives," tracing the various important steps in the manufacture and testing of Hercules explosives, supplemented with scenes showing the results obtained by their use. Showings of the picture will be continuous every day. *In attendance—W. R. Ellis, John McCabe, A. E. Forster, Theodore Marvin, M. R. Budd, W. F. Koch, Hyrum Petersen and Al Stibich.*

• JEFFREY MANUFACTURING COMPANY, THE

Aerodyne mine fan, conveyanscreen crusher and feeder. *In charge—Roy L. Cox.*

• KANSAS CITY STRUCTURAL STEEL COMPANY

No description received. *In charge—H. A. Fitch, Jr.*

• KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

Electric display stand showing a cutaway view of the Kennedy ball bearing gearless crusher, explaining clearly the operation of company's gyratory crusher and pointing out the unsual features in a manner easily understood. Also displayed will be photographs, illustrations, blueprints and similar data on the Kennedy products. *In charge—B. A. Brannock and S. A. Madrid.*

• LANG COMPANY

Compressor unit, diesel engine, and hoist. *In charge—Arthur E. Smith.*

• LINK-BELT COMPANY

No description received.

• MANCHA STORAGE BATTERY LOCOMOTIVE COMPANY

See Goodman Mfg. Co.

• MARION STEAM SHOVEL COMPANY

Large photographic display illustrating the use of power shovels in open pit mining. *In charge—L. C. Mosley.*

• MILLER FREEMAN PUBLICATIONS

Copies of *Mining World*—a new monthly publication featuring mining in the Northwest, initiated in July, 1939.

• MINE SAFETY APPLIANCES COMPANY

Safety products for mines, including: skullguards, M.S.A. self-contained oxygen breathing apparatus, dustfoe and comfo dust respirators, gas masks, first aid kits, safety shoes, goggles, Edison electric cap and hand lamps, and the H-H inhalator.

New products displayed will be a complete line of dust-counting and dust-analyzing equipment, including the M.S.A. midget impinger for sampling dusts, the M.S.A.-Spencer dust counting microscope, the Konimeter, and the Microprojecter for rapid, accurate, easy counting and size-determination of dust particles in collected impinger samples. Other new products to be shown are: the new Model "P" Edison electric cap lamp, the M.S.A. bakelite explosives carrier, the M.S.A. trolley wire guard, the speed-frame and the new and improved dustfoe respirator. *In charge—D. F. McElhattan.*

• MINING CONGRESS JOURNAL

Will distribute free copies of August Metal Mining Convention and Exposition Number, featuring numerous fine articles of particular interest to metal mining men, and a complete write-up of scheduled events for the Convention, together with a preview of exhibits to be displayed at the Exposition. *In charge—Richard J. Lund.*

• MONTANA STATE EXHIBIT

No description received.

• NATIONAL TUBE COMPANY

See U. S. Steel Corporation Subsidiaries.

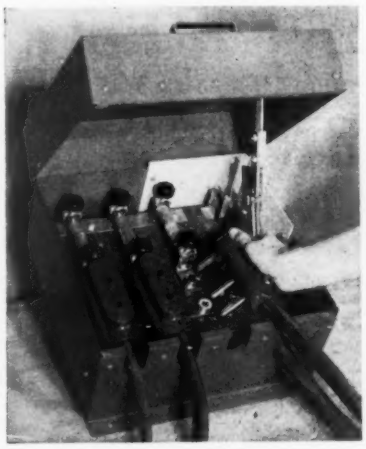
• NORDBERG MANUFACTURING COMPANY

Models of various types of crushers, with a background of enlarged pictures showing a variety of installations in ore dressing plants. *In charge—Delbert Kay.*

• OHIO BRASS COMPANY

A complete line of trolley and feeder electrification materials, including: the new M-6 section insulator switches, HM and HMC hanger-mounted quick break switches and special Bulldog wing clamp for use with the new Type G fused trolley taps.

Also to be shown are: a new fused interlocking junction box for three circuits; a new open-type junction; a special plier-type ground clamp for attaching to bond strand; the new Type G fused trolley taps; several new types of bonds; Universal and heavy-duty harps and shoes, and the new Type F shoe and harp. *In charge—J. C. Wilson.*



• PACIFIC BALL MFG. COMPANY

Ni-hard ball mill liners and balls. Ni-hard is often characterized as "the hardest cast material available commercially," thus effecting important economies in use as liners in grinding operations. *In charge—G. M. Leach or A. G. Zima.*

• **POMONA PUMP COMPANY**

Model mine sinker pump, a cut-out of Pomona mine turbine pump, impellers and bowls, showing pump's construction. Also special literature on company's complete line of mine pumps. *In charge—T. C. Butler, Jr.*

• **ROEBLING'S SONS COMPANY, JOHN A.**

Reception booth, with samples of wire rope and insulated wire, together with advertising literature. *In charge—F. J. Maple.*

• **SALT LAKE BLUEPRINT AND SUPPLY CO.**

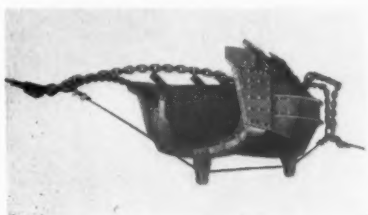
No description received.

• **SALT LAKE HARDWARE COMPANY, THE**

Complete line of Wood hand shovels, showing details of construction; and Westinghouse arc welders and other Westinghouse products.

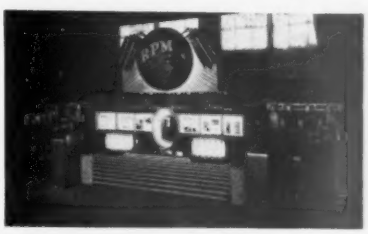
• **SAUERMAN BROS.**

Sauerman Durolite wire rope blocks and Sauerman Crescent scraper buckets to be displayed in front of a background composed of an enlarged action photograph of Sauerman drag scrapers, slack line scrapers, and tower machines handling open pit mining, stockpiling, placer mining, etc. *In charge—D. D. Guilfoil*



• **STANDARD OIL COMPANY OF CALIFORNIA**

Will feature company's new "RPM" Diesel engine lubricating oil for all types of Diesel engines. By means of illuminated, colorful panels and a unique mechanical piston which appears to operate without visible support, the advantages of this product will be interestingly presented. Actual parts of engines which have undergone severe operation tests with the new product will also be displayed. According to the company, the oil is particularly noted for its ability to prevent ring sticking, to keep engines clean, to reduce filter clogging, and to cut engine wear. *In charge—A. L. Ellsworth.*

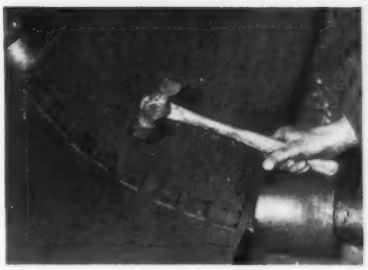


• **SULLIVAN MACHINERY COMPANY**

Reception booth, with copies of catalogs and bulletins dealing with the company's extensive line of hoists, drills, compressors, etc., used in the metal mining industry. *In charge—H. T. Walsh and R. T. Banks.*

• **TALCOTT, INC., W. O. & M. W.**

Complete line of belt fasteners as used in the metal mining industry for conveyor, elevator and transmission belting. Display will include photographic enlargements of actual installations, along with sections of all types of belting fastened with the Talcott fastener, featuring company's special conveyor fasteners and Acme patch fastener



—the former used for splicing the ends of conveyor belting, while the latter is used for emergency repairs to damaged belting. *In charge—M. W. Talcott and G. W. Little.*

• **TEXAS COMPANY, THE**

Complete line of company's lubricating oils for mine use.

• **TIMKEN ROLLER BEARING COMPANY, THE**

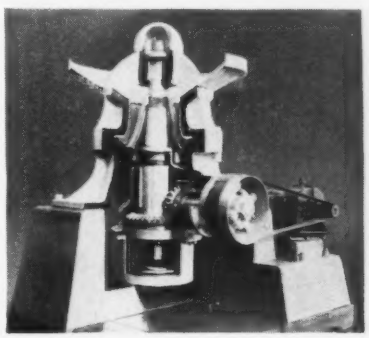
Complete dramatization of the use of Timken rock bits as applied to modern mining methods. Exhibit will contain a complete assortment of all sizes of Timken rock bits and Timken steels, together with several mechanical displays pertaining to the operation of the bits.

• **TOOL STEEL GEAR & PINION COMPANY**

No description received. *In charge—L. R. Riter.*

• **TRAYLOR ENGINEERING AND MFG. CO.**

Cutaway model of Traylor type TY reduction crusher, showing details of construction and operation. According to the company, the crusher is a very compact machine of simple design, combining maximum strength and high efficiency. It occupies a minimum of floor space, requires little head room and is easily and economically maintained. *In charge—S. W. Traylor.*



• **UNION WIRE ROPE CORPORATION**

No description received. *In charge—Evans Powell.*

• **U. S. BUREAU OF MINES**

No description received.

• **UNITED STATES STEEL CORPORATION SUBSIDIARIES**

Cooperating in this joint exhibit are the American Steel and Wire Company, Carnegie-Illinois Steel Corporation, Columbia Steel Company and National Tube Company, all subsidiaries of the U. S. Steel Corporation. On display will be an attractive presentation of steel products used in the metal mining field, featuring: replaceable Lorain liner plates; Cor-Ten lightweight corrosion resistant steel as used in mine cages, skips and cars; American Tiger brand wire rope and a wide range of electrical wires and cables; Duroline and other tubular products; light rails and metal ties, and steel mine timber sets. Also to be shown photographically in an attractive animated display will be the wide range of steel castings made by Columbia Steel Company. *In attendance—H. E. Fryer, T. Haskell, M. K. Stewart, G. H. Waite, W. Wood and representatives from Columbia Steel Company.*

• **UTAH OIL REFINING COMPANY**

No description received.

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Exposition Preview

• UTAH POWER AND LIGHT COMPANY

A topographical picture of the territory served by the Utah Power and Light Company and its subsidiary, the Western Colorado Power Company, with lines and generating stations superimposed in fluorescent paint will be irradiated with "black-light" to show the source of company's electric service for the intermountain mining industry. *In charge—D. H. Hutchinson.*

• VICTAULIC COMPANY OF AMERICA

Complete line of Victaulic couplings and fittings, with power driven models operating under pressure and simulating actual field conditions, which will demonstrate such unique construction features as angular flexibility, provision for contraction and expansion, and leak-tightness. Also featured will be new line of Victaulic "Full Flow" pipe fittings, reducing friction losses. *In charge—M. C. Hutchinson and R. W. English.*

• WESTERN CARTRIDGE COMPANY

Company's complete line of blasting caps, samples of which will be mounted on a modernistic and colorful background panel. *In charge—E. B. Smoot.*

• WESTERN COLORADO POWER COMPANY

See Utah Power and Light Company.

• WESTERN PRECIPITATION CORPORATION

Small sampling electro-filter unit for use in dust determinations of metallurgical gases, together with other conventional types of gas sampling and measuring equipment. These items are found useful in the accurate measurement and regular check-up on losses of value in smelter stacks and other operations where air and gases are disposed of to the atmosphere.

• WESTINGHOUSE ELEC. & MFG. COMPANY

Electrical equipment for complete 4-yard electric shovel, including a motor generator set, hoist motor, swing motor, hand- and foot-operated master switches, resistors, and control contactors, a majority of the units to be operating. This will afford visitors to the company's booth the opportunity to actually operate Westinghouse shovel equipment.

A revolving platform, which simulates a shovel cab, will be operated by the vertical swing motor under control of a foot-operated master switch, exactly as in actual shovels. In addition, a motor-bearing housing, motor-field coil and motor- and generator-armature coils will be shown as cutaways.

The force-ventilated shunt-wound hoist motor is rated at 187.5 hp., 230-volt, 435 r.p.m. The swing motor is a 37.5 hp., 575 r.p.m., 230-volt, shunt-wound, ball-bearing shovel-type vertical unit.

All generators on Westinghouse shovel motor-generator sets are of open construction and have horizontally split frames and bearing housings. The rotating part of each motor and generator is carried on two sealed ball bearings in sealed housings. Flexible couplings are on tapered shafts between the units. *Representatives in attendance will include: W. D. Turnbull, P. McShane, G. B. Rosenblatt, L. E. Brown, and T. M. Googin.*

• WOOD SHOVEL & TOOL CO.

See Salt Lake Hardware Co.

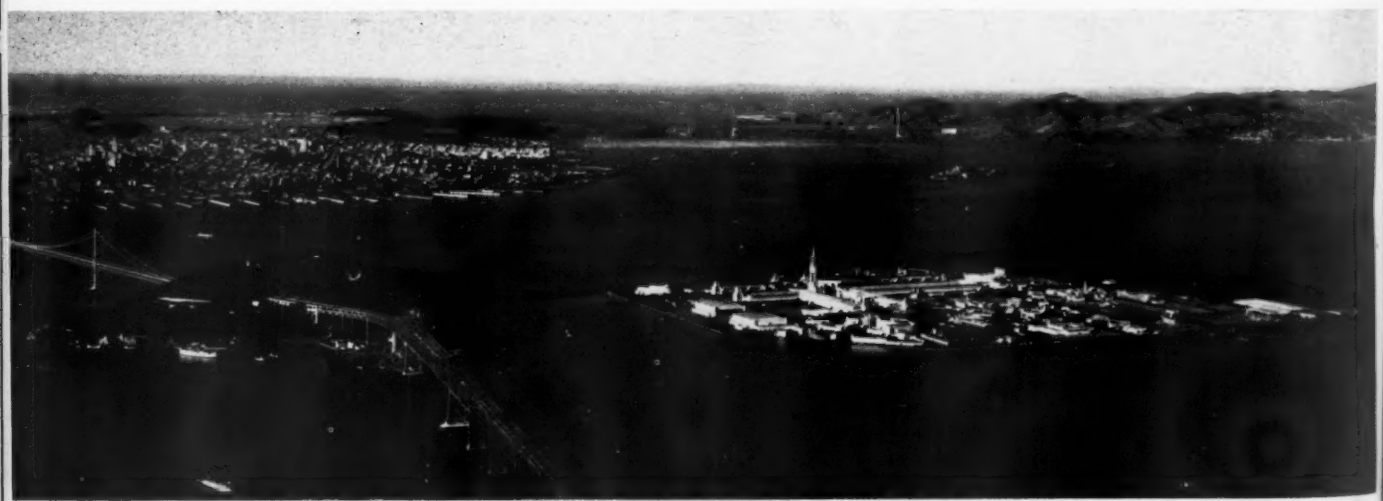
Sightseeing Opportunities Unrivaled

Scenic attractions of world-wide renown abound within a few hundred miles of Salt Lake City, and may be conveniently seen either going to or returning from the meeting.

To the south lie the all-inspiring national park triplets—Grand Canyon, Zion Canyon and Bryce Canyon—marvels of nature's art of coloring and sculpture. To the north are the breath-taking wonders of Yellowstone; and to the east, the yawning chasm of Royal Gorge and world-famed mountain drives through enchanted Rocky Mountain National Park. To the west, there's thrill-packed Yosemite, and a little farther on the world-famed San Francisco Golden Gate Exposition on Treasure Island.

The setting is ideal for mixing business and pleasure by attending the metal mining convention, with side trips to the Fair or some of these parks.

"SEE YOU IN SALT LAKE CITY."



San Francisco's famed Golden Gate Exposition on Treasure Island, framed in a beautiful setting of water, islands and huge bridges, will lure many visitors on the way to or returning from the A. M. C. Convention at Salt Lake

Trends in DIAMOND DRILLING

By HARRY A. KURTZE
Mechanical Engineering Division
E. J. Longyear Co.

DIAMOND drills are becoming increasingly recognized as an economical means of drilling for a multiplicity of purposes. There are many proven fields for the use of diamond drills: exploration and prospecting, planned mining, drainage, grouting, ventilation, foundation testing, and oil field geology. Other fields are being successfully entered; for example, in domestic and foreign mines alike, the diamond drill is becoming a competitive factor as a blast hole drill.

Modern manufacturing methods, standardization of products, utilization of new materials, and research on the part of mining companies, the government, manufacturers, and contractors have contributed to improvement in diamond drills and resulted in their wider use.

Weight of Machines

There is a tendency to lighten weight in machines for underground drilling or for use in districts not easily accessible. For surface drilling, however, weight usually is not a serious drawback. More powerful engines, additional labor and time-saving equipment, crawlers, collapsible masts and self-propelling attachments are increasing the efficiency and adaptability of core drills.

Trend from Screw to Hydraulic Feed

The present trend from screw feed to hydraulic feed is the reverse of the practice 15 years ago. Many factors are responsible—built-in oil pumps are used, frequently giving pressures of 1,000 lb. per square inch, and new types of feed-control valves are making the work of drill runners easier and more effective.

Simple attachments are available, permitting instantaneous adjustment of the pressure in the hydraulic system to adapt it to varying drilling conditions. The hydraulic feed rate can be set and will remain so while the chuck is run back at full speed. Duplex gages show the operator the working pressure as well as the back pressure on the piston, permitting him to estimate quickly the bit pressure.

When powered by the drill motor, water-circulating pumps are driven through a transmission so the operator can regulate the flow and pressure to suit conditions. These pumps operate independently of the drill itself.

Trends in Power for Drilling

The use of steam-powered drills has decreased; besides being heavy, their boilers are cumbersome, and fuel is often difficult to obtain and transport.

Internal-combustion engines are today the most universally used prime movers for drills. They are dependable, economical to operate, and reasonably low in weight. Diesel engines are preferred where the cost of gasoline is prohibitive.

Electric motors are used increasingly, since modern enterprises usually have adequate facilities for electric power transmission.

Air motors are easy to operate, and the tendency to freeze has decreased with most up-to-date types. The power drop of air motors with lower air pressures is considerable. At 60 lb. per square inch, for example, an average air motor will develop only about 65 percent of its power at 80 lb. per square inch. Good air pressure and adequate piping are prerequisites for the successful use of air motors.

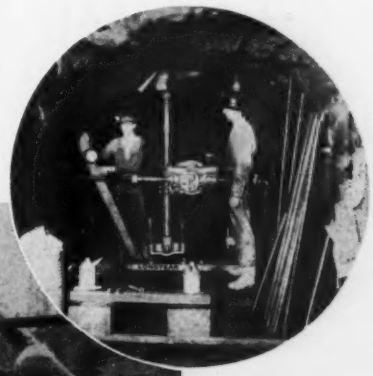
Speed and Rate of Feed

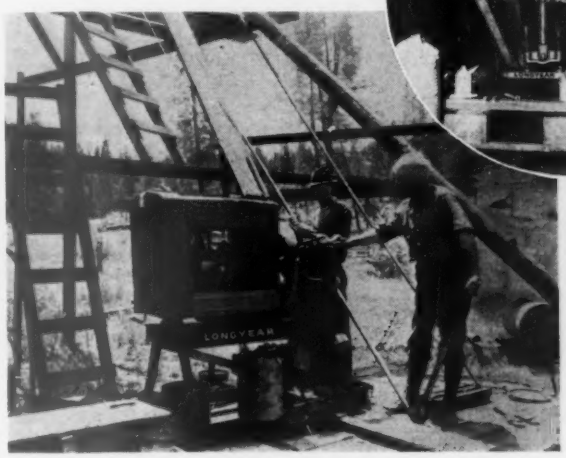
Years ago, bit rotating speeds of 500 r.p.m. were considered sufficient, whereas today speeds of from 1,000 to 1,500 are common. Machines with speeds as high as 3,500 r.p.m. are commercially available.

For best results in drilling, it is important to use feed gears suited to the rock drilled. In the past, selection of a proper feed was left to the experience and good judgment of the runner. However, the increased use of diamond drills and the employment of men less familiar with the technique of drilling make it advisable for a customer to state what formations will be drilled. The most suitable feed gears can then be selected and recommendations as to bit pressures can be made.

Drill Capacity and Nature of Rocks

Capacities of drills are usually given proportionate to the power of the motor and to the size of the hole they will make. However, capacity is not only a function of power, pressure





Above—Prospector drill equipped with air motor; capacity 300′ of 7/8″ core

Left—Junior straitline drill with gasoline motor; capacity 750′ of 7/8″ core

and speed (a drill rated at 500 ft. for ordinary speeds may drill to only 200 ft. at 2,500 r.p.m.), but even more so of the nature of the rock—hard, tough, abrasive, brittle, sticky, broken or solid.

Much research is being done to give us a better picture of the characteristics of rocks. An extended Mohs scale where the diamond has been given a hardness of 15 is a step forward. A corrected hardness scale with diamonds from 36.4 to 42.4, boron carbide 19.7, black silicon carbide 14, tungsten carbide 12, corundum 9, and quartz 7 is still more practical. Research work which might result in establishing a scale of "drillability" of rock is very much to be desired.

Bits and Bit Advance

Bits set with small borts have been a large contributing factor to the popularity of diamond drills today. Large investment in black diamonds is unnecessary. Bit costs have been reduced, and increased bit rotating speeds have become practical.

Several makes of machine-set borts bits are on the market. In some, the bort is set in a metal powder, or crushed and mixed with a metal powder, then pressed into shape. On cast-set bits, borts are held in place within a mold into which the metal is poured. Upon cooling, the borts crystals are more firmly imbedded in the bit than those set by hand. These bits are accurate, with each stone set to perfect gage.

At the high bit rotating speeds used with borts bits, it is important to provide waterways of ample capacities, to have the diamonds exposed, and to keep the bits clean.

In general, increasing the bit rotating speed will give a faster advance. However, increased bit pressure will not always result in faster drilling progress, for it depends also on the nature of the rock. For every type of rock there should be an optimum bit advance depending on the right combination of speed and feed. Too high a bit speed without sufficient pressure will polish the bit. The power of the machine, and wear and life of the bit are important factors in bit advance.

Rotating speeds and bit pressures are usually in inverse proportion to one another. It follows from this that with highest pressures no rotating speeds will be used. Dry soil samples and cores of soft semi-consolidated formations can be taken with standard diamond drills equipped with a special "core sampler bit" by driving the bit, without rotation into the soil. Drills with hydraulic feed cylinders capable of producing bit pressures of 22,000 lb. are being built.

Importance of Eliminating Vibrations

Vibrations play an important part in high-speed drilling. Whipping of drill rods and vibrating of machines can cause serious damage to the bit, lessen core recovery, block the barrel, and affect adversely the drill capacity. In a test recently conducted on the Longyear testing stand, it was shown that elimination of vibrations lowered the load on the motor 40 percent.

While great strides have been made in drilling short and average depth holes through the use of higher bit-rotating speeds, the completion of 8,000- and 10,000-ft. holes in South Africa gives proof of the efficiency of diamond drills for deep exploration.

CHART Depicts Importance of METAL MINING to UTAH

THE assertion that mining constitutes the very backbone of the existence of the population of many of the western states has repeatedly been made, but only recently has a study come to light proving conclusively just how important it is to the well-being of Utah—a state that may well typify the situation obtaining in such other states as Arizona, Colorado, Idaho, Montana, Nevada and New Mexico.

Facts illustrating to what extent business in Utah is directly dependent upon workers in metal mining (a primary industry) are clearly portrayed in a novel manner on the accompanying chart, prepared by B. E. Mix, engineer of the Utah Copper Company, and his office staff. Statistics on which the chart is based were presented in a pamphlet dated May 15, 1931, compiled by Rolland A. Vandegrift and Associates, specialists in economic and governmental research—the latest basic data of this nature available. It is probable that the general picture has not changed materially since that time, although recent employment in Utah mining may have shown a drop in comparison with the figures cited in the pamphlet.

The compilation is based on the number of persons directly dependent upon 1,000 primary workers. The number of persons shown for each group includes those gainfully employed and their families, and is based on an average of 3.682 persons for each family.

Not included in the chart are workers out of the state who are engaged in the production and sale of prepared foodstuffs, wearing apparel, manufactured articles, etc., that are purchased for the use of the primary metal mining workers and of those directly dependent on them.

The chart illustrates that not only are the various groups employed dependent upon the metal mining group, but are also dependent on each other. For example, the Retail Distribution Group shows a total of 2,320. Of this number, 561 serve and are supported by the metal mining group; 363 serve and are supporting its own group; 217 serve and are supported by the Personal and Professional Group; 127 serve and are supported by the Service Manufacturing Group; 167 serve and are supported by the Building Trades, and so on. Likewise, the other groups serve and are supported by the primary workers in the metal mining group and all other groups.

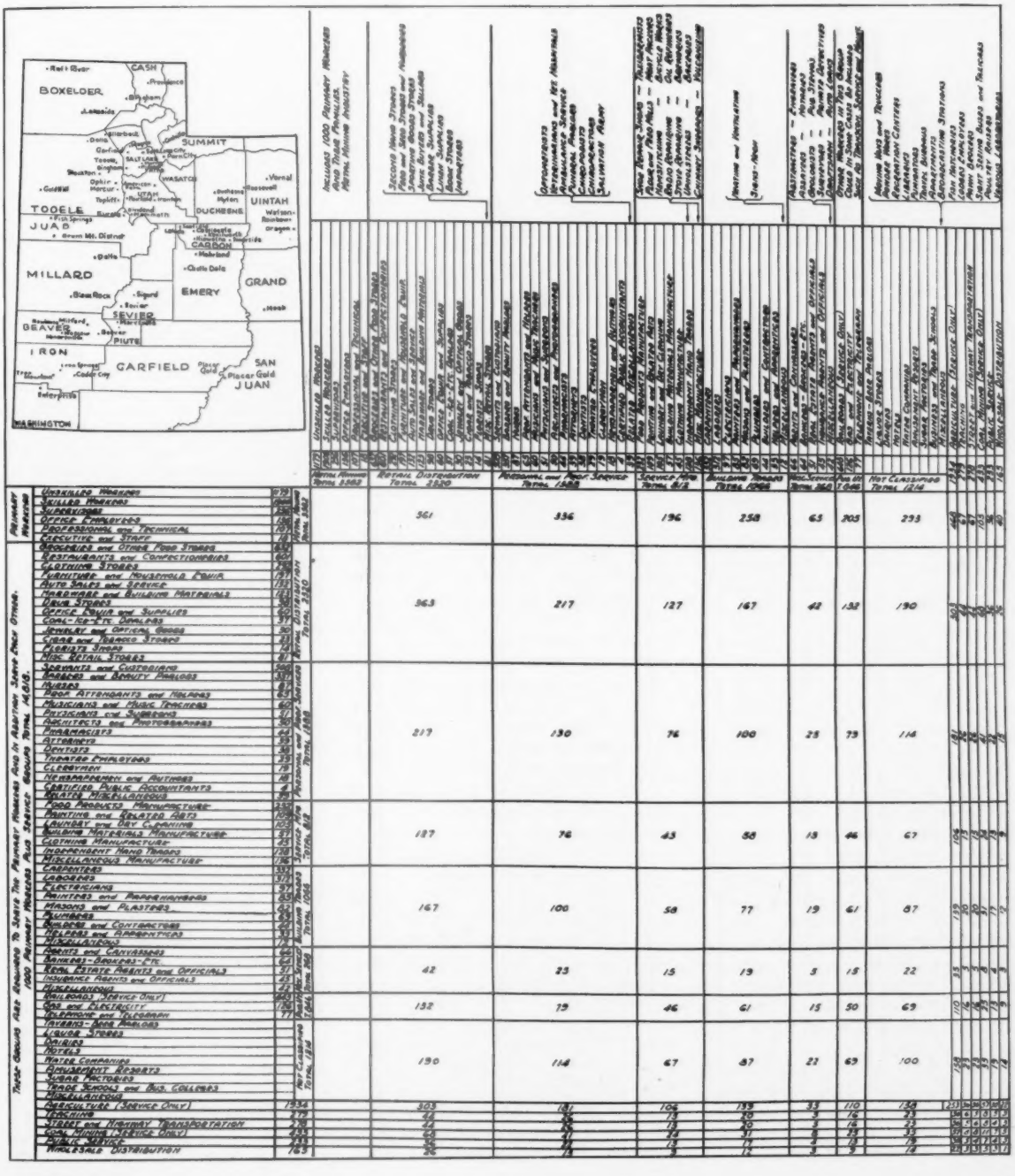
The chart also indicates that for

each 1,000 primary workers, their families represent an additional 2,582 persons, and that the other groups serving the primary workers, and each other, require 3,137 additional persons gainfully employed, and also that their families add another 8,099 persons. On this basis, the 1,000 primary metal mining workers are providing a livelihood for 3,582 persons of their own group, and 11,236 persons of the other groups, thereby forming a community of 14,818 persons.

It has furthermore been estimated that the population dependent upon the metal mining industry of the State of Utah for the year 1930 was 239,605 persons, or 47.17 percent of the population of the entire state.

This is indeed a clear indication of the vital importance of metal mining in the western states, and should go a long way in justifying the emphasis placed on this question repeatedly in the past, and serve as a warning against saddling the industry with such burdensome taxes and restrictive regulations in the future as may result in "killing the goose that laid the golden egg."

Persons Dependent on Each 1000 Primary Workers in Utah's Metal Mining Industry
(Map of Utah from Salt Lake Mining and Contracting Review)



Has the SEC Expanded Its Powers Beyond Those Intended By Congress?

By GULLIE B. GOLDIN
Member of New York City Bar, and Formerly of the General Counsel's Office, Securities and Exchange Commission
BALDWIN B. BANE
Director, Registrations Division, Securities and Exchange Commission

● ***G. B. Goldin Says Procedure for Registration Has Been Twisted Far Out of Pattern Congress Designed for It.****

ON MARCH 29, 1933, President Roosevelt sent to Congress a brief message recommending legislation for the "Federal supervision of traffic in investment securities." The President gave utterance, in contrast with the ancient maxim of "caveat emptor," to the new concept, "let the seller also beware." The brevity of the message was unusual, but more significant was a short, concise sentence.

"The purpose of the legislation I suggest," the President said, "is to protect the public with the least possible interference to honest business."

It is a matter of speculation whether the zealous architects of the legislation who, with the sanction of the White House, promoted this act through Congress, secretly wished for governmental censorship and veto over the sale of securities. But what the Securities Act says on this subject is not a matter for speculation. Its very language refutes any notion that Congress intended to create a governmental instrument to pass upon, approve or qualify securities for sale in the first instance.

Registration Mechanism

Sections 5 to 8 of the act set forth the registration mechanism. The general scheme is simple. The act makes certain transactions in a security unlawful unless a "registration statement is in effect" as to such security, and provides that any security may be registered with the commission, under the terms and conditions provided in the act, by the simple procedure of "filing" a registration statement with it. Section 23 of the act, in effect, contains a Congressional edict prohibiting the commission from passing upon the merits of a security or giving approval to it.

So far the device merely provides for the "full publicity and information" the President's message demanded. However, Congress decided that a 20-day "waiting period" between the filing of the registration statement and its effectiveness was desirable. This "waiting period" sought the accomplishment of certain practical objectives: (a) to eliminate quick, high-pressure selling; (b) to provide an opportunity for investors to familiarize themselves with the filed information before selling commenced, and (c) to afford the commission an opportunity to make a preliminary check of the data and materials filed.

Neither in Sections 5 to 8 of the act nor in any of its other sections is there any provision that gives or even inferentially purports to give, directly or indirectly, any authority to the commission to censor and interdict a registration statement before it becomes effective.

Order Prior to Date

There is one exception to this. Section 8b allows the commission to issue an order prior to the effective date refusing to permit a registration statement to become effective until amended "in accordance with such order," if it appears to the commission that a registration statement is "on its face" incomplete or inaccurate in any material respect. Even the exercise of that power is carefully restricted by a provision that the commission must give notice of hearing not later than 10 days after the filing of the registration statement and grant an opportunity for a hearing not later than an additional 10 days after such notice.

It is evident that the 20-day waiting period was a matter of grave concern to Congress. It surrounded this with definite safeguards by providing, in effect, that: (1) during the 20-day period the commission would review a registration statement merely for the purpose of determining whether it was incomplete or inaccurate "on its face," that is, whether it exhibited obvious departures from the law and rules, such as a failure to fill in a form properly, a failure to observe a rule, a patent inaccuracy or the like; (2) if it discovered such a deficiency "on its face," it would bring on a hearing within the 20-day period, subject to the right of a registrant, upon learning of his error, to grant the commission an extension of this 20-day limit by voluntarily filing an amendment. The words "on its face" are not peculiar words of art, and plainly define the limits of the commission's authority.

Intention of Congress

Thus Congress clearly intended that a registration statement would ordinarily become effective 20 days after its filing. What the commission may do with a registration statement after

* Reprinted from Financial Section of June 25 edition of *The New York Times.*

it becomes effective is another matter. The point is that Congress did not empower the commission to place a registration statement under a microscope immediately upon its filing and then proceed like a laboratory technician to make a tedious search for all kinds of flaws. It is improbable that such a procedure would have been acceptable to Congress, since it is apparent that in the hands of extremists it would easily result in a complete destruction of the principle of registration as expounded by the proponents of the measure. In failure to observe the mandate of this provision resides a tremendous power for evil.

Are we justified in the assumption that nothing like this will happen? After six years of administrative experience the answer is that probably it already has happened. The attitude of the SEC toward the 20-day waiting period has been cynical—if not sinister. It has whittled away gradually the fundamental principle of the waiting period to the point where the statutory requirement is virtually meaningless. There is a grave threat to the legislative policy upon which the entire Securities Act rests.

The very mechanics of the registration provisions of the act clearly reveal that Congress intended that the SEC would not set itself up as a board of censorship for the purpose of submitting to microscopic scrutiny every registration statement as it is filed; that the SEC would not allow the dialectics and pedantry of an academic forum to establish the standards upon which conformity by business men with the registration requirements of the Securities Act was determined, and that the SEC would recognize the validity of the President's statement that there should be "the least possible interference to honest business." Let us see how the SEC has carried out this mandate.

Rules and Regulations

Read the Securities Act itself, and registration looks simple. But read the 65 printed pages in the General Rules and Regulations. You will find 80 rules under Regulation C. They cover many things, down to and including the width of margins on the statement. You will also find reference to forms and instruction book. You get an eight-page guide to forms, and find there are 13 rules for 13 forms.

Let us take Form A-2 and see what it calls for. It contains 13 pages of small type, and asks answers to 46 questions, some of them going back into the company's history for 17 years. The instructions sent along with it comprise a bulky book of 55 legal-cap pages, single-spaced. It contains 20,000 words. So much for one of the 13 forms. If you digest everything, you should be able to fill out a registration statement.

But should you? Actually speeches by SEC officials, press releases, interpretative opinions by the SEC general counsel and commission decisions appear to constitute law just as much as the printed matter.

Queries on Procedure

Let us suppose that, having penetrated this thick woodland of rules and instructions, the registrant finally has filed a registration statement covering, for example, an issue of $125,000 of stock or bonds of a relatively small industrial enterprise. Will it become effective at the expiration of 20 days after the filing? Can the registrant go forward with his business plans and make commitments on the reasonable expectation that funds will be available promptly? Is he justified in relying upon the 20-day waiting period prescribed in the Securities Act? The answer in all probability is "No."

The SEC is not authorized to inquire into the soundness of the business venture, but in cloistral seclusion it will do so, although the registrant probably never will know this. If the SEC thinks it is unsound, a subtle effort, often incapable of detection, probably will be made to frustrate the registrant's plans. If it seems sound, the regular routine will be followed.

The preliminary check intended by the act to determine whether the statement is incomplete or inaccurate "on its face" is transformed into a searching investigation that generally goes far beyond the "face" of the statement. It is a search for minutiae "off the face" as well as "on the face" of the registration statement. It is unusual that a registration statement filed without prior consultation with the SEC will become effective at the end of the 20-day period without a deficiency notice.

The SEC has invented the technique of the "deficiency letter," which notifies the registrant of certain deficiencies claimed by the SEC and calls upon him to file an amendment before the end of the 20-day period. This deficiency letter, ignoring the mandate of Section 8 (b), generally embraces all manner of objections "on" and "off" the face of the registration statement. It may even go so far as to request the registrant to furnish merely for "the information of the commission," and not for the registration statement, considerable collateral information and data not called for by the Securities Act or any rule.

Advancement of Date

If, under the duress of the deficiency letter, the registrant files an amendment, the filing date of the registration statement, pursuant to Section 8 (a) of the act, is advanced to the date of the filing of the amendment, and the 20-day period is reckoned from the latter date, except where the commission has consented to or made an order requiring the filing of the amendment. The filing of the amendment may be followed by other deficiency letters and other amendments, all of which make for a substantial enlargement of the 20-day waiting period.

In order to facilitate the extension of the 20-day period, the SEC has popularized the use by registrants of a so-called delaying amendment, which, relating generally to some minor item in the registration statement, such as the "proposed date of the public offering," has the sole object of postponing the effective day beyond the 20-day period. Even Rule 943 formalizes this inducement by the SEC to postpone further the effective date of the statement.

Why has the SEC been permitted to practice such perversion? The answer is found in the cleverness of the SEC personnel, their almost fanatical will to drive in the direction they think is right without too much regard for legal barriers, and the realities of the situation in which those who are directly affected find themselves.

Sanction for Procedure

There is bare color of legal sanction for the SEC's destruction of the principle of the 20-day waiting period in the provisions of Section 8(d) of the act. This, unlike Section 8(b), provides that the commission may suspend the "effectiveness" of a registration statement after notice and hearing if it appears "at any time" that it "includes any untrue statement of a material fact or omits to state any material fact required to be stated therein or necessary to make the statements therein not misleading." It is much broader than Section 8(b) which, in order to give effect to the 20-day waiting period, limits the authority of the SEC to refuse to permit a registration statement to become effective at the expiration of the 20-day period to a finding that it is "on its face incom-

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plete or inaccurate in any material respect."

The argument can be made that the words "at any time" mean "at any time before and after" the effectiveness of the registration statement. However, this argument naively disregards the important fact that Section 8(d) clearly deals with a registration statement that has become effective and that, giving ordinary effect to the language and tenor of Section 8(d), the words "at any time" mean at any time after a registration statement becomes effective.

But the SEC has a more coercive weapon than casuistry. It gives the registrant the choice of one or two courses, telling him, in effect: "You can amend and defer the effective date beyond 20 days, or you can refuse to amend; if you refuse to amend, the registration statement will become effective at the expiration of the 20-day waiting period, but on the 21st day you will receive from us a telegraphic notice of a 'stop order' proceeding before the commission to suspend the effectiveness of the statement. Which do you prefer?"

Effect on Registrant

A "stop order" hearing is a serious thing for a registrant. With the issuance of the notice of hearing goes the usual SEC release to the press of the country, spreading a cloud over the registrant's proposed security issue through the length of the land. It even casts suspicion upon the general honesty of the issuer and the integrity of his business.

The issuance of the notice itself has the same general effect as the issuance of an injunction order forbidding the sale of the security. Further, it places the registrant in a position where a willful violation of the act easily may be proved in the case of subsequent criminal proceedings against him. The registrant is immediately stopped, even long before the commission holds its hearings and makes its final order.

A recourse to the courts would be futile, because, in addition to the delay involved, the Securities Act makes it difficult to obtain an adequate review, on the facts, of a routine order of the commission. More recently the SEC has adopted the practice of allowing a registration statement, under certain circumstances to become effective "under a deficiency notice." There is very little difference in practical effect upon the registrant. The realities of such a situation leaves the registrant without a choice. He must yield to the pressure of a powerful governmental agency. That is why important financiers and industrialists have been quiescent and why the small business man merely looks on.

Legislative Limitations

Reporting for the House committee on the original bill, Representative Sam Rayburn declared that "such functions as are given the commission with reference to the initial filing of the registration statement are limited merely to determining whether the information so filed is complete and accurate on its face. * * * But with the truth or falsity of the answers the commission has no initial concern."

Senator Fletcher, reporting to the Senate, declared that "it has been deemed essential to refrain from placing upon any Federal agency the duty of passing judgment upon the soundness of any security."

Representatives Rayburn, Huddleston, Lea Parker and Mapes reported to the House after the bill went to conference that the commission in the 20-day period "is expected to make only a preliminary check-up."

The SEC certainly has failed to keep within the legislative limits prescribed by Congress by statute. The above paragraphs illustrate that it cannot argue that Congress failed to say what it meant.

The intricate registration structure fashioned by the SEC, in combination with an extraordinary pedantry on the part of the brilliant young academicians of the SEC, has operated to beget a litter of interpretations and decisions by the SEC that for sheer dialectics possibly is unparalleled in the history of American jurisprudence.

Introduction of Distinctions

SEC juggling of the registration provisions of the act and introduction of a jargon of metaphysical distinctions virtually have nullified the registration principle set up by Congress. This annulment slowly is producing a specialized branch of law, alien to the accepted principles of the common law, in which, under the influence of rationalism, trifling points are used as legal tests for determining whether business conduct is right or wrong. The business man is confused by his inability to determine in advance what the law requires him to do.

It is inconceivable that Congress intended to give the SEC power to restate the law or alter our legal system. Yet in the place of the humble structure designed by Congress, the SEC has built a pretentious estate which it considers more suitable for its purposes. There are some who think Congress was fooled from the beginning, but that is not now important. The important thing is that the effect of the administration of the registration provisions of the act upon the issuer or registrant of a security has been well-nigh disastrous.

● *Baldwin B. Bane Defends Procedural Methods Developed and Used by the S.E.C. as Falling Within Intent of Congress*

THE Securities and Exchange Commission was accused in a recent article in the *New York Times* of perverting the Securities Act of 1933 and the purposes of Congress by insisting that registration statements and prospectuses filed with it fairly and accurately disclose the known information material to an investor before they become effective and by giving to registrants an opportunity to correct the statements and prospectuses before the effective date and before the securities are offered.

Such an accusation requires an answer not only because of ugly implications of a wilful design to undermine the sound philosophy of the Act and to harass and impede financing, but also because the article typifies a form of misrepresentation and distortion which the Act itself condemns. Furthermore, the public may be misled by the reference to the former association of the writer of that article with the Commission and impute to his statements an authenticity not justified by that association or the experience of the writer with the subject of which he writes.

It has been my privilege to observe and participate in the formulation of the policies which have been adopted under the Securities Act of 1933. I

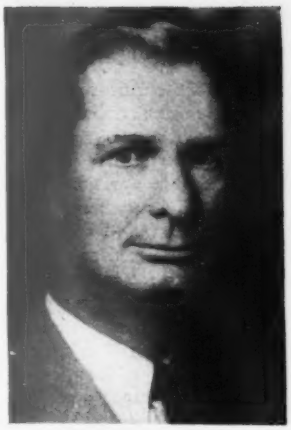
have been in close contact throughout the life of the statute with the many classes of persons who have felt its impact. It seems to me appropriate at this time to present a brief review of the factors which have influenced the evolution of the registration procedure.

Factors Influencing Evolution of Registration Procedure

It should be recalled that prior to the passage of the present Act Congress considered more rigorous forms of legislation and discarded them in favor of the "disclosure" type of statute. It was decided that the protection of investors, the fundamental purpose of the law, should be sought with the least possible interference with business and the financing mechanisms. The Commission, therefore, was given no authority to pass upon the merits of a security or to prevent the sale of a security, no matter how unsound it might be considered by some, so long as the registration statement and prospectus contain a fair and accurate disclosure of the facts concerning the security and the issuing company. Congress recognized, however, that a mere registry, a so-called public library, for registration statements, could not alone be relied upon to insure the investor such disclosure. Accordingly, administrative tools in the form of certain powers were conferred upon the Commission by Section 8 of the statute. It is necessary that the nature and purpose of these powers be understood before an intelligent appraisal of the present procedure can be made.

Section 8 (a) in general provides that a registration statement shall become effective on the twentieth day after filing unless an amendment is filed. An amendment has the effect of establishing a new filing date and starting a new 20-day period running. The Commission, however, is given the power to relate the filing of the amendment back to the original filing date when such action is not detrimental to the public interest. This practice has, somewhat inaccurately, become known as "acceleration."

Section 8 (b) provides that when a registration statement appears on its face to be materially incomplete or inaccurate the Commission *after formal hearing* may issue an order *prior to the effective date* refusing to permit the registration statement to become effective until amended in accordance with such order.



BALDWIN B. BANE

Section 8 (d) provides that *if at any time* it appears to the Commission that a registration statement includes an untrue statement of a material fact or omits any material fact required or necessary to make the statements made not misleading the Commission may *after formal hearing* issue an order suspending the effectiveness of the registration statement, such order to remain in effect until the Commission shall declare that the statement has been amended in accordance with the order.

Section 8 (e) authorized the Commission to make *a formal examination* in any case in order to determine whether a stop order shall issue under sub-section (d).

The Commission also is empowered to institute court proceedings for the purpose of enjoining violations of the statute and may recommend the institution of criminal proceedings by the Attorney General. It should be recalled, of course, that the statute subjects the issuing company, its directors and principal officers, and the underwriters to certain liabilities in civil and possibly in criminal actions in the event that securities are sold in violation of the registration provisions or in violation of the disclosure requirements of the Act.

Examination of Material Intended by Congress

Consideration of the foregoing provisions clearly leaves no doubt that it was the intention of Congress that the Commission examine the information filed with it. Failure to do so would, in my opinion, be a clear violation of the spirit of the law itself. It is true that the Act does not specifically provide any particular method of informally advising registrants of errors or defects in their registration statements. But early in the administration of the Act it was decided in the interest of good administration and in order to treat registrants fairly, to point out informally to the registrant material misrepresentations or omissions in the information filed with the Commission, rather than allow the defective statement to become effective and then either permit the securities to be sold upon such misrepresentations or institute stop order proceedings. Consequently, it has been the practice to examine the information filed and give the registrant, within approximately 10 days after filing, a letter or memorandum pointing out what, if anything, appears to be materially wrong with the statement and afford the registrant an opportunity to correct the statement before the effective date and before the securities are offered.

The purpose of the law and the Commission's regulations is to insure to investors the opportunity of exercising investment judgment based upon a fair disclosure of the facts concerning the enterprise. It is obvious that a policy which in the interest of disclosure invoked formal proceedings under Section 8 in the case of every registration statement requiring material amendment would subject the issuer and the underwriter to needless expense and delay. The Commission under such a policy would be justly charged with obstructionist tactics, of standing by in silence knowing of defects in a registration statement without attempting to assist the registrant to comply with the requirements of the law, of laying a trap for the unwary or the inexperienced registrant, of employing unfair methods. The Commission under such a policy could fairly be accused of an unintelligent administration of the law.

Deficiency Letter's Purpose

That is precisely why we have developed the informal method of informing registrants of defects in their statements—the so-called deficiency letter. Mr. Golum tries to make something insidious out of the deficiency letter. Actually, the use of the letter is generally accepted as a distinct service to registrants. It is merely an extension of the conference idea. Often, representatives of the registrant are in a position to confer personally and informally with our staff on registration problems. But for the benefit of those who cannot do this, and in

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order to make the registration procedure sensible and orderly, we have devised the deficiency letter.

The Commission has no authority specifically to require an amendment to the registration statement. In fact, suggestions made by the Commission are sometimes discovered to be inappropriate after discussion with the registrant. At times it is necessary to request the company to submit supplemental information which will contribute to the understanding of a complicated situation. The striking feature of the whole process, however, is the element of flexibility which is injected into the registration procedure and which permits free discussion of the cases and the securing of effective dates, in cases of well prepared statements, normally on the twentieth day after original filing, without resort to formal proceedings.

Experts Aided in Drafting Forms

What has been overlooked in the criticism is the fact that the registration process and the rules and regulations of the Commission, rather than being the product of "academicians" and "extraordinary pendantry," represent the carefully developed adaptation of suggestions of some of the most experienced lawyers, accountants and business men in the country to the problems presented by the Securities Act. The first registration form employed under the Act was devised in consultation with members of law and accounting firms who for years had been counsel to issuers and underwriters. Early recognition was given to the specialized requirements of special classes of issuers. Experts in those industries were drafted to assist in the preparation of forms and rules suitable to the special needs of their particular fields. It seems obvious, for example, that questions designed to elicit useful information from a long established manufacturing company are scarcely suitable for a new promotional mining enterprise.

Forms Being Revised

It should be noted, however, that we have no feeling of perfection as far as our forms are concerned. It is well known that we are at present working on a substantial revision of the whole schedule of forms to the end that they may be more serviceable both to investors and registrants. The policy of attempting to sharpen requirements to the conditions of particular types of issuers will, of course, be continued. The Commission is constantly striving to improve its forms and regulations, and will continue to seek the comments, criticisms and suggestions of those who would be affected thereby. Though the regulations may seem detailed to those unfamiliar with the law and business problems, the entire structure of forms is designed to secure a business-like presentation of material information.

To summarize, experience clearly indicates that the method we have adopted is not only effective in securing the kind of information which Congress wanted investors to have, but is of immense help to registrants. In other words, I believe we have proved that the functions of serving investors and at the same time assisting issuers to comply with the law are anything but always incompatible. We are constantly attempting to perfect this method of administering the Securities Act. Had the author of the foregoing article had, during his employment at the Commission, any experience with the problems involved in the creation of new security issues and their distribution, he would certainly have learned that our present practice of examining registration statements prior to their effectiveness is valued as an aid in the preparation of registration statements by the overwhelming majority of attorneys and experts who represent security issuers before the Commission.

Increased Gold and Platinum Production Mark 1938 Alaskan Mining

Mines in Alaska produced minerals worth $28,607,000 in 1938, as against $26,989,000 in 1937, according to a recent announcement made by the United States Geological Survey. The total value of the mineral output of the Territory since 1880 is $777,818,000, or much more than one hundred times the $7,200,000 paid to Russia for the entire Territory at the time of purchase in 1867.

Value of the total mineral production from Alaska mines in 1938 was greater than in any other year with the exception of the three years 1915, 1916, and 1917, when the demand for copper created by the World War lifted the output of that metal to unprecedented heights.

The value of the output of gold from Alaska mines in 1938 was more than a million dollars greater than in any other year in the entire history of gold mining in the Territory.

The quantity of platinum metals recovered from Alaska mines in 1938 was much greater than in any preceding year and amounted to more than 88 percent of the total quantity of all platinum metals that have come from Alaska mines in all preceding years.

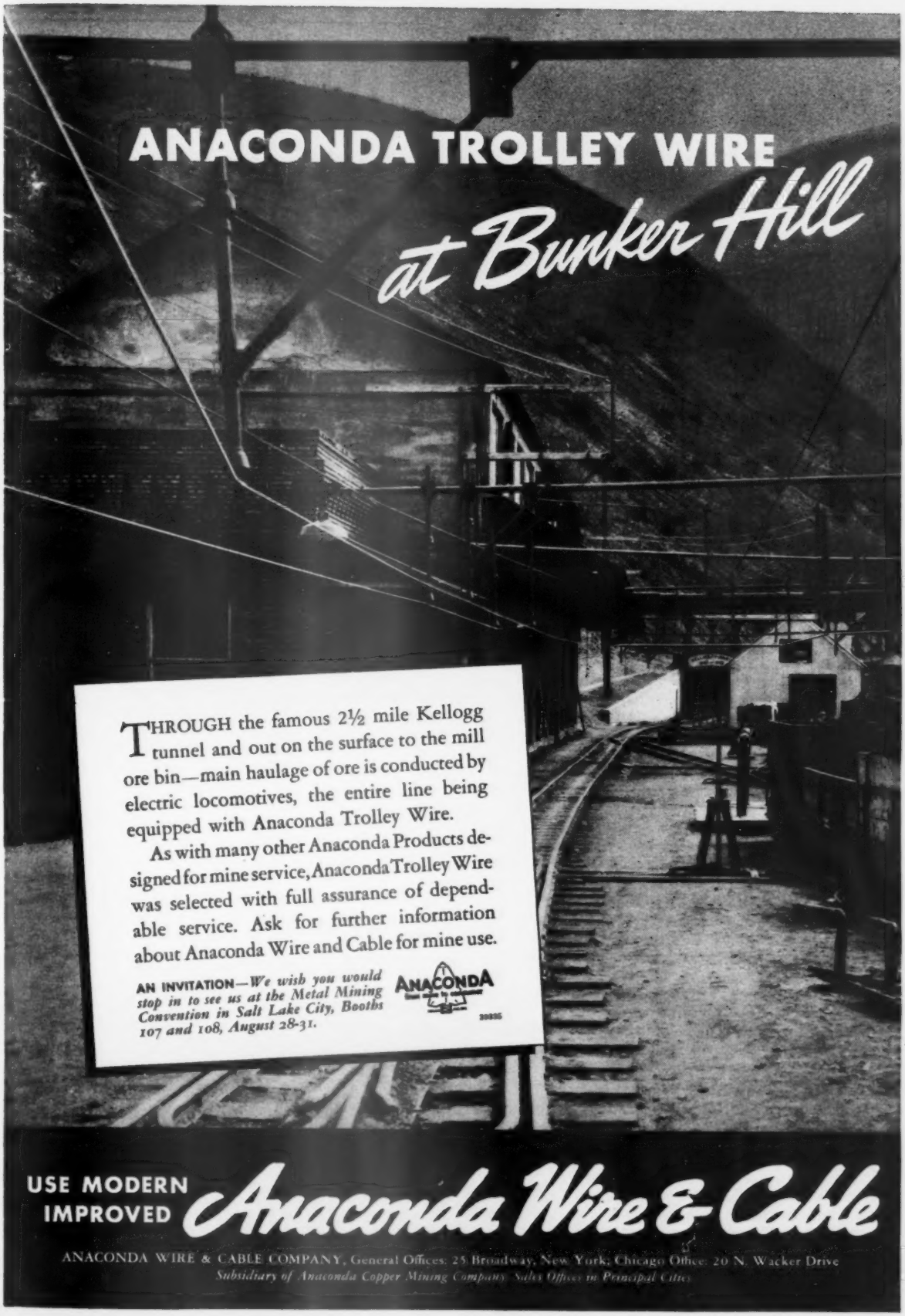
In comparison with 1937, there was an increase in both the quantity and value of the production of gold, platinum metals, and coal; an increase in quantity, but a decrease in value of the production of lead; and a decrease both in quantity and value of the production of silver, copper, tin and miscellaneous mineral products.

—■—

Resume Iron Ore Production In Canada

Early this summer, the Algoma Steel Corporation, of Sault Sainte Marie, Ontario, expects to be shipping iron ore from its New Helen mine at Michipicoten, where a subsidiary, the Algoma Properties, Ltd., is rebuilding the surface equipment. Including the cost of a sintering plant at the nearby village of Wawa, the total investment will be approximately $1,300,000. It is estimated that the deposit to be worked contains reserves of 60,000,000 tons of iron carbonate (siderite), which is high in sulfur content and must therefore be roasted before being charged to the blast furnace. Initial capacity of mining operations is expected to be 450,000 tons annually, which, when beneficiated, will yield about 300,000 tons of ore with an iron content of 50 percent. The output of this mine will represent the first ore mined in Canada for the production of iron since 1923, when 30,752 short tons were shipped (the peak was reached in 1915, with 398,112 tons). From 1924 to the present, iron ore has been produced in the Dominion only from a deposit near Baie St. Paul, Quebec, which is worked for its titanium content.

The Michipicoten ore will be mined from an open pit until the depth of 200 ft. is reached. It will be carried by aerial tramway 2½ miles to the sintering plant, and from there about 7 miles over the Algoma Central Railway to Michipicoten Harbor on Lake Superior. Because the ore has a 2- to 3-percent manganese content, the Algoma Steel Co. expect to use only half the output and sell the remainder to other Canadian and American furnaces. The exploitation of the New Helen mine has been undertaken as the result of the passage of the (Ontario) Iron Ore Bounty Act of 1937, which authorizes the Provincial Government, during the 10 years beginning January 1, 1939, to pay a bounty on iron ore "raised or mined" in Ontario at the rate of 2 cents per "unit," one unit being 1 percent of metallic iron per long ton. The bounty on the New Helen ore will therefore be approximately $1.00 per ton of beneficiated ore.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With the COAL DIVISION

of the AMERICAN MINING CONGRESS

THE DEVELOPMENT of MODERN MINING*

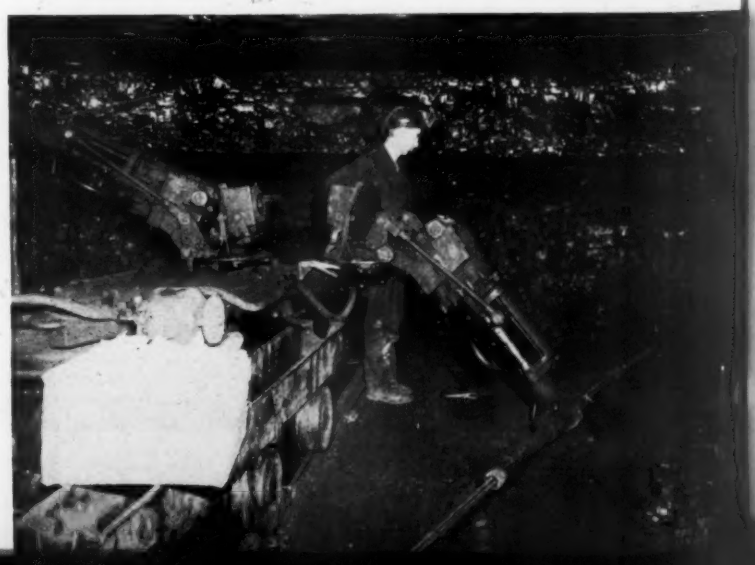
By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

THE terms "modern mining" and "mechanization" have come into quite general use during the last few years, but before discussing this subject it might be a good thing to explain just what we mean when we talk about mechanization. This is frequently misunderstood as describing something very new in coal mining, when as a matter of fact, true mechanization—that is, the application of mechanical power—is not at all new in the coal industry because none of us here today or our fathers before us for that matter, can remember as far back as the time when power-driven machines were not being used in coal mines. We can go clear back to the invention of the steam engine and there we find that the first successful application of steam was in operating a pump in an English coal mine, more than 100 years ago, and before the steam locomotive or the steamboat had been invented. Then, tracing the course of progress from that early beginning, the pumps were followed by steam hoists, steam fans and steam-driven rope haulage. A little later, but before the Gay Nineties, came the compressed-air locomotive and pneumatic coal punchers; until finally we reached the more recent invention of the electric motor and its consequent application to all mining operations—cutting, drilling, haulage, loading, conveying, screening and cleaning. Even the telephone for underground communication, motion pictures for safety programs and the electric eye for automatically opening and closing doors on haulage roads are among familiar applications of power. Certainly a list of these things shows that mechanization is no more a new or recent idea in coal mining than it is in any other industry.

But even though mechanization is not new, nevertheless everyone who is engaged in coal mining is fully conscious that fundamental changes are taking place in operating methods. New types of equipment are being adopted and naturally there are divergent views as to the benefits that will be gained by changing from long-established practices. We all know that the change has not been easy; difficulties of many kinds were encountered and many people took these difficulties to be evidence that the older ways were really the best and most practicable. If this view had proven correct and if it had not been possible to improve production efficiency, then coal mining would be in a bad position because the real reason and the only reason that coal has started on its modernization program is to stay in business. Oil and natural gas are our real competitors—we are foolish to believe that the reserve supply of these two sources of power is limited and we are therefore faced with the certainty that if the coal industry makes no effort to meet this competition, then coal mining is very definitely on the way out. So, none of these new things are being developed with the thought of being modern in the sense of keeping up with the times or staying in fashion, but they are the answer being made by coal to the highly scientific and highly efficient production methods of its competitors.

Developments in Last Decade

This modernization is really an evolution which started some years ago without our really being conscious of what was happening, and it is only when we stop and look back over the developments that have been made in the last 10 years that we can get a correct prospective of what is going on and can see that these changes have affected every operation underground and on the surface. Taking first the things that were in their early stages of development 10 years ago but are in quite common use today, we can make a rather impressive list. Universal machines for cutting and shearing, cutting bit tipping with hard alloys, electric coal drills, mechanical loaders, face and gathering conveyors, heavy steel for main haulways, wood



Use of mounted electric coal drills has expanded greatly during past decade

* Extract of paper presented at Beckley, W. Va., to the New River and Winding Gulf Mechanical and Electrical Institute.

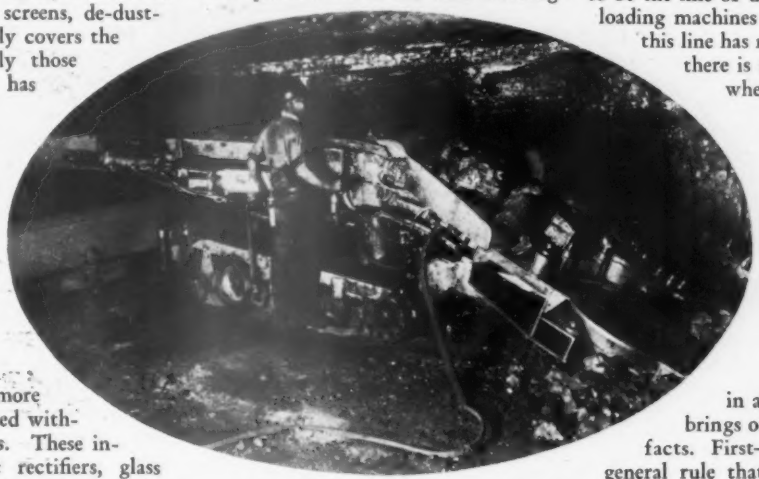
preserving for ties, large capacity steel mine cars, large trolley and feeder lines, sectionalizing mine circuits, automatic starters for fans and pumps, portable substations, aeroplane propellers for mine fans, light steel alloys for equipment and tools, mechanical cleaning, vibrating screens, de-dusting. This list merely covers the high spots and only those things whose use has become more or less commonly accepted practice in mining within the last 10 years. There are, moreover, a number of rather new developments which are just gaining attention, but which we may be very sure will be more or less widely adopted within the coming years. These include mercury arc rectifiers, glass fibre for electric insulation, spring bumpers, automatic couplers and hydraulic brakes for mine cars, and rubber-tired haulage.

It is not possible to take the time that would be necessary to describe and discuss each of these new things. Besides, all of us are to some degree familiar with them. However, it may be worth while to briefly discuss mechanized loading, since the invention and adoption of mechanical loaders and conveyors completed the final link in the chain of mechanization, and since the substitution of mechanical loading for hand loading really started the modernization movement now under way.

Mobile Loaders Now Used in Thin Seams, and Conveyors in Thick Seams

As is well known, the two types of mobile loading machines operated are the track-mounted and the caterpillar tractors. Each of these has its own particular advantages and disadvantages, as well as its individual suitability for certain seam conditions, and it is not the purpose of this discussion to enter into that phase of the subject. It is worth mentioning, however, that in the early stages of their development, mechanical loaders were thought to be adaptable to thick seams only, and at least 6 feet of height was formerly a basic requirement. As the machines became more perfected and their use became more general, however, this limit has lowered year by year—to 5 feet, then 4 feet, until now there are mobile machines in seams approximately 3 feet high.

In conveyor mining, there is a decided trend toward multiple units; installations with three or four working places are now quite common, and in one operation there are nine working places discharging onto one central conveyor. There are many advantages in having a large tonnage concentrated from a small area by a multiple conveyor system, although this method requires great care in designing the mining plan, and in coordinating the operations of the various units and also necessitates the installation of adequate power distribution equipment for the various machines in the unit. If these matters are neglected or are gone about in a haphazard way, the operation will fail.



Loading machines are handling more and more of the nation's coal output

A further development in conveyor mining is the substitution of mechanical loading for hand shoveling. There are a number of successful operations where mobile loading machines are used for this purpose, and there is also a mechanical loader especially designed for face conveyors which is moved by ropes along the face in about the same manner as a shortwall cutting machine. In addition, there are the self-loading conveyors; one example is the well-known duckbill shaker and another is a chain conveyor which is set close to the face so that the coal is shot down directly onto the flights with a minimum of shoveling.

A trend which is gaining some attention is the application of conveyors to thick seams. For many years conveyors were considered to be most suited for thin seams, but installations are now being made in seams 5 feet and greater in height. This is of particular interest when viewed in connection with another trend, already mentioned in this article, of applying mobile loading machines to thin seams. In other words, a few years ago a 4-ft. seam height was generally considered to be the line of demarcation between loading machines and conveyors, but this line has now disappeared and there is an overlapping zone where each of the two distinct types of loading equipment are used.

Great Opportunity for Further Development

A study of the development that modernized coal mining has made in all fields of the U. S. brings out several important facts. First—that there is no general rule that can be laid down as to what is the best method or the best type of equipment for any set of conditions. There are too many factors that enter into each problem. Second—we can definitely say that the highest peak of efficiency has not yet been reached in any phase of mining from the cutting underground to the cleaning at the tipple. Third—it is not yet known today just how far we can go in the adoption of new procedures; that is, whether our best plan is to try to improve existing practices or whether we should design or invent something entirely new.

Fundamental Principles Applying to Modern Mining

While we are just in the early stages of complete mechanization and while there are a great many things still to be learned, there have been established during the past 10 years a number of fundamental operating principles that will apply to all types of modern mining with all types of equipment. One is that a completely mechanized mine is not a series of individual operations but is a closely coordinated unit. This is the principal difference between hand and mechanized operation. A hand-loading mine has a high degree of flexibility—men can be transferred from one place to another or from one job to another during a shift; each working place does not necessarily have to be operated each shift; the number of men employed in a section can fluctuate from one day to another; interruptions during the shift is in many cases nothing more than an incon-

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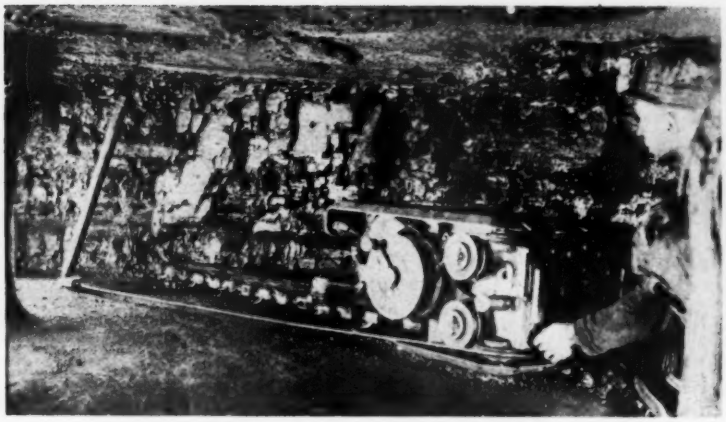
venience. In a mechanized mine, all this flexibility vanishes—each section or unit must perform all operations in a definite sequence or order, and any marked variation from this will either reduce production or increase the operating cost. Each unit must have a certain number of working places and a certain number of men on the crew, with each man trained to perform his specific duties. There is, of course, a slight amount of flexibility in the assignment of the work, but speaking generally, inefficiency will result if there is much shifting of the men about from one job to another. Interruptions from power, haulage wrecks, slate falls, etc., affect the production of the entire unit, and it has been found that a mechanized mine cannot afford to skimp on their expenditure for adequate power lines and haulage roads.



Use of machine cutters led coal mine modernization with extensive application. Improvements in design are constantly being made

Great Decrease in Breakdowns or Interruptions

Ten years ago, we can remember that our major concern was in the mechanical performance of the loading machines and the conveyors—that is, mechanical breakdowns or interruptions from inadequate power and inefficient haulage, which were a heritage from hand loading, were regarded, as in hand loading, as a part of the game and as things which must necessarily occur. Today we know that this is wrong. Machines and equipment have been designed to the point where breakdowns, during the shift, should be the exception rather than the rule. If they do occur, we can say that in most cases it is not the fault of the machine nor the fault of the equipment but it is the fault of the management.

The preventive for these interruptions are adequate power, well constructed haulways and continual inspection and maintenance. We all know that repairs made during the shift are costly; besides the loss of production, there is the further fact that such repairs are generally made as quickly as possible and are consequently not permanent. Therefore, the repair is very apt to fail and the trouble will be repeated. Mechanized mines have found that they simply cannot afford this cost and, as a consequence, the trend now is to prevent breakdowns by a regular system of inspection and by maintenance work before a failure occurs.

Another fundamental principle which has been discovered that applies to all mechanized mines, is that there must be very close coordination between all of the operations from the face to the tipple—each one must be properly balanced so as to fit in with the others. A chain is no stronger than its weakest link, and in a mechanized mine the production of each unit is determined by some one operation in the unit that is limited in its productive capacity or its performance efficiency. We frequently find instances where an operation that is running smoothly at a certain production per shift is thrown entirely out of gear when one part of it is either stepped up or stepped down. That is to say, when the loading machine increases its production, then either the cutting or the drilling of the haulage may not be organized to take care of this increase, and in such a case a general disarrangement results.

Rapid expansion of conveyor mining is now spreading to relatively thick seams

Value of Time Studies

Within the last few years we have come to know that a time study is the most accurate way of establishing a performance rate for a crew. But in this connection we have learned two very important facts; one is that a time study must be made by a skilled and experienced man who is familiar with all of the details of the operation and is able to determine properly the difference between delays that are chargeable to the operation being studied and delays that are caused through some other operation. The second requirement is to make a proper analysis of the time study figures because, after all, the only reason for taking a time study is to discover how the performance efficiency can be increased and how the cost can be reduced. The analysis, therefore, must show whether the number of men engaged in the various operations of the unit are correctly balanced and whether the production or the efficiency is being limited by the performance of a crew or by a part of it or by the capacity of one or more machines in the unit.

All of the above sounds rather complicated and, as a matter of fact, it is complicated, and the complexity of these problems calls for a higher type of engineering, supervision and management than was ever necessary in a hand-loading mine. This brings us an opportunity that we must not overlook: we are at the beginning of a new order of things and through our individual and combined efforts, through further study, research and invention, coal mining can be restored to its rightful place among the industries of our nation.

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WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

THE push for adjournment is on—the majority of the members of Congress want to go home. Congressional leaders on both sides are telling proponents of bills that there is no time left for consideration, and that their measures will have to go over till the next session in January. Many measures have fallen by the wayside, including the proposed neutrality changes which the Senate Committee on Foreign Relations has turned down, the amendment to the Walsh-Healy Government Contracts Act which was shelved late in July by the House Committee on the Judiciary, the Barkley-Mansfield Stream Pollution bill which was granted a rule by the Rules Committee and would have required only House consideration and Presidential approval to become law, and numerous other measures, particularly if they are involved in controversy.

There have also been situations approaching revolt, as in the case of the Hatch bill restricting political activity on the part of Federal office holders and employes, and also the determined resistance being offered in the House of Representatives to the so-called "spending-lending bill."

Taxation

Again as in the summer of 1937 the announcement has been made by Chairman Robert Doughton of the House Committee on Ways and Means that the regular tax sub-committee, under the chairmanship of Jere Cooper of Tennessee, will enter upon a study of tax revision plans in preparation for legislative enactments in the winter session of the 76th Congress which convenes early in January. The Tax sub-committee will remain in Washington for a few days after the adjournment of Congress, to work out the details of the studies which they propose to discuss soon after November 1. Preliminary work will be carried on through the balance of this summer and fall by the staff of the Joint Committee on Internal Revenue Taxation and also by the Treasury Department. It is not definitely known at this time that these tax studies will include the matters of vital import to the mining industry that were under discussion during the summer and fall of 1937, but it is well to be prepared, and every man interested in mining should get acquainted with and talk to his Congressional delegation while they are in their home district before they return to Washington.

Silver

After the President signed the Monetary bill on July 6 providing for the coinage of newly mined domestic silver at a price of 71.11c per fine ounce to the producers, it was realized that this price only applied to silver mined subsequent to July 1. The Treasury regulations applying to the prior 64.64c silver required that miners' affidavits and instruments of transfer be in the hands of the superintendents of the Mints on June 30. No provision was made for silver mined prior to June 30 on which instruments of transfer had not been filed, nor was any provision made for silver mined on July 1. The smelting companies agreed to defer the settlement date on such silver to August 31 in the hope that the administration would remedy the difficulty, for otherwise the silver miner would only receive the market price of approximately 35c per ounce. Concerted action on the part of Senators and Representatives from mining states resulted in the issuance of a Presidential proclamation on July 26 which authorizes silver mined prior to June 30 and on July 1 to be received for coinage by the Mint until December 31 at a price of 64.64c per ounce.

When the Monetary bill was on the Senate floor and just after the 77.57c price had been placed in the bill by amendment, word came from the Treasury that the 50 percent tax on transfers of silver would be levied upon the difference between foreign and domestic prices on all newly mined silver transferred to the Mint. This serious situation which would have cost the producers of silver around 20c an ounce was remedied in the conference committee, and the report of the conferees contained language, now in the law, which specifically exempts such silver from the 50 percent transfer tax.

National Labor Relations Act

By vote of 254-134 the House of Representatives on July 20 passed the resolution which called for a thorough investigation of the National Labor Relations Board by a committee of five members of the House. The committee chairman, Representative Howard W. Smith of Virginia, is a courageous man who owes allegiance to none but his own constituents, and who is expected to go into the misdeeds of the Board thoroughly and exhaustively. This action by the House is in decided contrast to the methods of delay employed by both the Senate and House Labor Committees in evading the issue of amendments to the Act in the present session of Congress.

Wage-Hour

Recent days have witnessed a most unusual situation brought about by the tactics employed by the House Committee on Labor in an attempt to secure the passage of amendments to the Fair Labor Standards Act, but at the same time preventing the inclusion of additional amendments which might be offered on the floor of the House. Representative Barden of North Carolina, a member of the House Committee on Labor, introduced a series of broadening amendments which met

the opposition of the Labor Committee, the Wage-Hour Division and the Administration.

At the insistence of Representative Cox of Georgia and others, a meeting of the House Rules Committee was called to consider the Barden amendments and to hear Administrator Andrews and House Labor Committee Chairman Mary Norton in an effort to develop a compromise measure and give it a rule for House consideration. The meetings were extremely hectic, and Chairman Norton, Representative Barden and Administrator Andrews were requested by the Rules Committee to endeavor to find some common ground. This they agreed to do, but Mrs. Norton instead called a meeting of the entire House Labor Committee and invited representatives of the C.I.O., American Federation of Labor, the Railroad Brotherhoods, agriculture, and others to appear and present their views. This hearing was held on July 28 and the representatives of the labor unions were unanimous in their expression that amendments should not be attempted in the present session of Congress. It was at this session of the Labor Committee that the attack was made on Vice President John Nance Garner by C.I.O. leader John L. Lewis.

On the afternoon of July 28 the Committee on Rules voted a rule for the original Norton bill, the Barden bill and the Ramspeck bill with the provision that the Norton bill should be considered first and be either accepted or rejected by the House. If rejected, the rule provides that either the Barden bill or the Ramspeck bill may be substituted, and these last two bills are open to amendment from the floor of the House. Late on July 28 the Labor Committee reported a revised Norton bill with the announced intention of asking for House consideration under a suspension of the rules on Monday, July 31. However, this was not done, and on August 3 the House leaders decided not to consider the rule on the three bills and the entire matter will go over to the next session in January.

It is interesting to note that the Ramspeck bill provides a maximum hours exemption for the mining and milling of non-ferrous metallic ores, or operations incidental thereto. This was placed in the bill by Representative Lawrence Lewis of Colorado and would permit a 56-hour workweek before payment of overtime. The revised Norton bill, reported on July 28 by the Labor Committee, also contains a 56-hour exemption for mining and milling of metallic ores or operations incidental thereto, conditioned, however, upon the further proviso "if the place of such employment, either by reason of high altitude, remoteness from established settlements, climatic conditions, or otherwise is relatively difficult of access."

While some form of wage-hour bill may pass the House, Chairman Elbert Thomas of the Senate Committee on Education and Labor has stated that hearings are necessary in the Senate and that there is not sufficient time left in the present session.

Inspection of Mines

The Senate Committee on Mines and Mining has reported the Neely bill (S. 2420), and in so doing removed the provision requiring the Secretary of the Interior to make inspections of mines at any time upon requests of a majority of the underground workers or their delegated representatives. Also stricken are the sections authorizing expenditures for the prevention of accidents or occupational diseases at the discretion of the Secretary, the permission to set up new agencies, and that providing for the creation of an advisory committee. In carrying out inspections, the Secretary of the Interior is required to cooperate with state inspection agencies and to notify such agencies of intended inspections, in order that state mine inspectors may participate.

In the House the Keller bill, which is a companion to the Neely bill, has not been acted upon by the Mines and Mining Committee. At a recent meeting of this committee the Keller bill was discussed, but Chairman Joe L. Smith, of West Virginia, told the committee that no report had been received on the bill from the Department of the Interior, and it is understood that the committee will not consider the Keller bill during the present session. If the Senate passes the Neely bill in the remaining days of the session, the danger lies in the possibility that an effort may be made by its proponents to secure House passage under a suspension of the rules in the last few hours of the session.

—Harris & Ewing

Statue of America's immortal Will Rogers recently unveiled in the rotunda of the Capitol

Bituminous Coal Division

On July 24 the examiners for the newly created Bituminous Coal Division in the Department of the Interior began what are designated as "final hearings" to establish minimum prices for bituminous coal in market areas No. 1 to No. 14, inclusive. It is the announced intention of Interior Secretary Ickes and Administrator Howard Gray to expedite the hearings and the final promulgation of prices in every possible way. Counsel, representing coal producers from the many districts, registered frequent objections with the examiners, charging illegality of the procedure on many points. All of these protests and objections were overruled by the examiners, but it is generally believed that price schedules will not be in force until some time in 1940.

It has been rumored for some time that Representative William P. Cole, Jr., of Maryland, would introduce a bill providing for coordinated Federal regulation of petroleum, gas, coal, and hydro-electric energy. Representative Cole's bill, when introduced on July 26, covered only regulations concerning conservation of petroleum and natural gas, and it appears that any attempts at coordination of Federal control of energy sources, for the present at least, will be handled by the existing Federal agencies plus the Office

(*Continued on page* 64)

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NEWS and VIEWS

Roster of Mechanized Mining Commission Announced

W. L. Robison, chairman of the Appalachian Wage Conference, recently announced that the Mechanized Mining Commission created by the Appalachian Wage Agreement which was signed in New York City, May 12, 1939, has by unanimous action selected the following men as its officers: Duncan C. Kennedy, chairman; Thomas Kennedy, secretary-treasurer; and Stanley C. Higgins, assistant secretary-treasurer.

The members named to the commission by the last Appalachian Joint Wage Conference are: M. L. Garvey, J. D. A. Morrow, Charles O'Neill, L. T. Putman, W. J. Wolf, W. L. Robison, P. C. Thomas, and L. E. Woods, or their representatives, for the operators' group.

Members of the Mine Workers' group are: John L. Lewis, Philip Murray, Thomas Kennedy, Van A. Bittner, Samuel Caddy, P. T. Fagan, James Mark, and John Owens, or their representatives.

Future meetings of the Mechanized Mining Commission will be held at the call of the chairman.

Silver in Stainless Steel

Possibility of a broad extension of commercial use of silver in marine uses of 18-8 stainless steel alloys is suggested by a patent recently granted on protection of the steel against seawater corrosion by addition of minute amounts of silver to the alloy. The peculiar corrosive properties of seawater have in the past been a serious, unsolved problem for stainless steel.

If a portion of a stainless steel plate is covered by, say, a barnacle, the difference in oxygen concentration near the exposed and the unexposed surfaces will set up an electrical potential favoring the formation of chlorides of the metals in the alloy. Since these chlorides are soluble, they wash away, leaving the surface exposed for further attack. Thus a submicroscopic pit forms and as it deepens, the difference in oxygen concentration between the pit and the body of the metal increases and accelerates the corrosion within the pit. Ultimately the interior is honeycombed with such pits, although the surface may appear entirely unmarred; and the steel becomes subject to sudden and complete failure, almost without warning.

A solution to this problem, recently worked out by Prof. R. S. Williams and associates at the Massachusetts Institute of Technology, is based on the insolubility of silver chloride in seawater. Laboratory tests indicate that as little as 0.42 percent silver added to the alloy will reduce the corrosion rate more than 80 percent, since the insoluble silver chloride formed remains as a protective coating. Only in alloys of approximately 18-8 composition (18 percent chromium and 8 percent nickel) does the small amount of silver appear to be adequately dispersed, but these are the most popular of the stainless steels.

Many advantages other than corrosion resistance are claimed for the silver alloys. Probably most important, since stainless steel is now considered unsuitable for many uses requiring high heat conductivity, is the reported increase of 26 percent in thermal conductivity on adding only 0.14 percent silver. Other advantages include improvement in the ease of machining and ability to take a higher polish. A very uniform, highly polished surface in itself inhibits corrosion, since it makes inception of electrolytic activity difficult.

Accidents in Relation to Coal-Mine Mechanization in Illinois

A report on coal-mine mechanization and accident frequency rates of hand and mechanical loading in some coal mines in Illinois has been recently issued by the Bureau of Mines, Department of the Interior. The term "mechanized mining" as used today by mining men of Illinois refers mainly to mechanical loading, according to A. U. Miller, associate mining engineer, author of the report. However, in the fullest sense, mechanization of the mines has been in progress for many years. To show the extent of this progress, a brief history is given of mining in Illinois.

There has been considerable discussion during different periods as to whether mechanical equipment increases the accident hazard and is responsible for a higher accident rate. Such discussions are often heard today regarding hand compared with mechanical loading. To make a just comparison of the accident rates and mechanical loading would be difficult, if not impossible, as the operating conditions of each method differ to a large extent. There are some commendable practices followed in each method and some that should be condemned.

Undoubtedly mechanical equipment, whether cutting, loading, drilling, or other types of machines, increases the mechanical, electrical and other hazards if proper precautions are not observed, and practices and methods of working changed to suit conditions. The noise vibration of the machinery prevents workers from hearing roof "working," and it is almost a certainty that vibration of the machinery affects loose roof. In the early days of mechanical loading there was a

"Chief" Buehler Honored at Testimonial Dinner

Dr. H. A. Buehler receiving from Senator E. W. Allison a silver geological pick, presented to him by citizens of Rolla at a testimonial dinner honoring Dr. Buehler on the completion of 30 years in the office of State Geologist. Dr. Buehler went to Rolla 38 years ago from the University of Wisconsin, serving 8 years as chemist in the Geological Survey, following which he was appointed state geologist. He is the oldest state geologist, in point of service, in the United States. Speakers at the dinner stressed Dr. Buehler's accomplishments during this period in developing the natural resources of Missouri.

tendency to neglect systematic timbering and sounding of roof, as well as other safe mining practices; and to some extent this neglect still exists. As a number of men frequently are working at the face at one time, the hazard from roof falls is increased. If a large fall should occur it is more likely to kill or injure two or more men at one time, and this has occurred. There are also other hazards introduced with increased use of mechanical loading equipment.

However, some phases of mechanical loading should be conducive to a lower accident rate. With mechanical loading, a foreman may have the 15 to 50 men under his supervision concentrated in a small area, which should permit him to supervise them and the district closely and observe and remedy unsafe practices and conditions relatively promptly. If this is done it will be an important factor in the prevention of accidents.

Usually the efficiency of 15 to 20 men may be involved in the operation of one mobile loading machine, which if it is to be fully achieved will require better track and rolling stock, closer inspection, and better maintenance of mechanical equipment and electrical circuits, systematic timbering, and sounding of roof, greater care in the placing of shot holes and handling explosives, and other safe practices and methods of working, which will result in a lower accident rate, as well as greater efficiency. If any of these requirements are neglected the result is likely to be increased accident occurrence as well as decreased efficiency.

Copies of Information Circular 7063, "Coal Mine Mechanization and Accident Frequency Rates of Hand and Mechanical Loading in Some Coal Mines in Illinois," may be obtained from the Bureau of Mines, Washington, D. C.

Expansion of Calmich Holdings Announced by Mack Lake

The Calmich Mining Company, Mack C. Lake, president, San Francisco, Calif., recently took over large holdings in the Mooney Flat and Smartville, Calif., district, owned by the Interstate Land Holding Company, of which W. G. Allen is secretary. The properties virtually surround the Blue Point mine, now operated by the Calmich Company, and provide a large continuous body of gravel for several miles along the Yuba River and Deer Creek. Investigations are being made to determine possibilities of mining the entire gold deposits by modern open-pit methods, with present underground drift operations to be continued.

New Mining Building at Arizona U. to be Built by Phelps Dodge

The University of Arizona has been assured a new College of Mines Building, expected to cost in excess of a quarter of a million dollars, the entire project to be paid for by the Phelps Dodge Corporation. The university's board of regents recently voted unanimously in favor of accepting the corporation's offer, made on behalf of its board of directors by P. G. Beckett, vice president.

All mining engineering work will be carried on in the new building, while the present one will continue to serve the civil engineering, electrical engineering, and mechanical engineering departments. The new building will permit expansion of curricula and make it possible to train more mining men. The college now has a registration of 383, with 93 registered in mining engineering.

The building will be named in memory of Dr. James Douglas, prominent copper-mining pioneer of Arizona.

Harry Moses Heads Program Committee For 1940 AMC Coal Convention

The American Mining Congress takes pleasure in announcing the acceptance by Harry M. Moses, president of the H. C. Frick Coke Company, of the chairmanship of the Program Committee for its 1940 Coal Convention and Exposition.

In accordance with strong appeals voiced early this year, the work of planning the program for this important annual event is being initiated several months earlier in order to afford ample time for selection of subjects of most widespread interest and for the preparation of papers which will be definite contributions to the art of coal mining.

Appointment of the complete membership of the Program Committee is now going forward. Under the capable and inspiring leadership of Mr. Moses, a program of maximum value to the coal industry is assured.

V. L. Kegler Elected President of Texas Mining and Smelting Company

Election of V. L. Kegler as president of the Texas Mining and Smelting Company was announced following the annual meeting of the stockholders held June 29. Mr. Kegler succeeds H. P. Henderson in this office. Other officers elected at the same meeting were: W. J. Graveling, vice president and manager; F. G. Trobridge, secretary and treasurer; and H. M. Irvin, assistant secretary and treasurer.

Magma Air Conditioning Extended Lower

Extension to the 4,000 foot level of the air conditioning system which made the Magma Copper mine, Superior, Ariz., the first mechanically air conditioned mine in the United States, was recently announced by Magma officials. The previous air conditioning extended to the 3,600-foot level.

The system was designed especially for Magma by Willis H. Carrier, who supervised the air conditioning for the famous Robinson Deep gold mines in South Africa. Centrifugal refrigerating machines will be used for the cooling. Water will be taken from condensers now on the job and sprayed through a tunnel. Foul air from the mine then will be taken from an upcast shaft and blown through this fine spray to cool the water. This air-cooled condenser water is returned to the collecting tank and used for condensing in the two Carrier centrifugal refrigerating machines, installed on the 3,600-foot level.

Illinois Mining Institute

The forty-seventh annual meeting of the Illinois Mining Institute will be held at the Hotel Abraham Lincoln, in Springfield, Ill., on Friday, November 10, according to a recent announcement by B. E. Schonthal, secretary-treasurer of the organization.

Featuring the meeting will be presentation of honorary life membership certificates to Eugene McAuliffe, president of the Union Pacific Coal Company, and to Thomas Moses, vice president of the U. S. Steel Corporation and formerly president of H. C. Frick Coal Company.

Start Driving Cripple Creek Drainage Tunnel

Driving of the proposed Carlton drainage tunnel in the Cripple Creek, Colo., district to unwater the lower levels of mines got under way July 15. The project will cost between $1,000,000 and $2,000,000.

Construction of the road to the tunnel site has been completed, and equipment has been moved there. The 33,000 ft. tunnel will require four or five years to construct. Water from the tunnel will be sold for irrigation

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purposes, and will be emptied into Four Mile Creek, which flows into the Arkansas River.

With plans for the new tunnel definite and work actually under way the Golden Cycle Corporation early in July started pulling pumps from the lower levels of the Ajax mine, and will hold up deep production until the mine workings are drained by the new tunnel. It cost Golden Cycle some $83,000 in 1938 to pump the water up to the Roosevelt drainage tunnel. When the equipment is removed, the territory between the 20th and 26th levels will be covered by water, and production will be maintained above the 20th level. Men who have been working on the lower level will be given jobs on the new Carlton drainage tunnel.

Fluorspar, Lead and Zinc Separated From One Ore

The unusual problem of separating fluorspar, lead and zinc, from a single ore by flotation has been solved, and details of the process have just been published by the Bureau of Mines, United States Department of the Interior, as Report of Investigations 3437.

The aim of the Bureau of Mines investigators was to produce lead concentrates relatively free of zinc and fluorspar and moderately free of lead, and fluorspar concentrates practically free of sulphides and containing at least 98 percent of fluorspar.

This objective was obtained through investigations by the Metallurgical Division of the Bureau of Mines in cooperation with the Mahoning Mining Co. of Kansas and the Missouri School of Mines.

Conditions were established under which selective flotation produced the desired results. Quebracho, a crude tannin extract, was found to be very effective in this separation.

Wheels of Government

(*Continued from page 61*)

of Petroleum Conservation in the Department of Interior, as contemplated in Representative Cole's bill.

Stream Pollution

House leaders are understood to be of the opinion that the Barkley-Mansfield stream pollution bill will not be acted upon in the present session. This "planning and survey" measure is being constantly attacked by the wild life and nature societies who are advocating passage of the Mundt bill, a harmful mandatory measure similar to that introduced by Senator Lonergan, of Connecticut, several years ago.

Authorities estimate that 1,000,000 base boxes of tinplate worth $5,000,000 literally "goes to the dogs" every year as canned dog food.

A PREGNANT WARNING

The following release was sent out recently to thousands of railroad and express employes by the Railroad Employes and Tax Payers Association, Inc., of Richmond, Va., and vicinity, giving pertinent cost comparisons of oil and various types of coal for domestic heating. The warning of what may transpire if coal continues to lose markets to competitive fuels is boldly and cleverly emphasized.

A DREAM THAT IS FAST BECOMING A REALITY

THE CHESAPEAKE VIRGINIAN WESTERN NORFOLK AND OHIO RAILWAY COMPANY

GENERAL OFFICES

OFFICE OF THE PRESIDENT

Richmond, Va., June 20, 1939.

TO DEPARTMENT HEADS:

Gentlemen—

You, of course, realize that 85 per cent of all of our business is derived from coal freight revenue which is rapidly declining, due to the installation in the City of Richmond and its metropolitan area of over 20,000 oil-burning furnaces at the present time, and these installations are rapidly increasing. These 20,000 oil burners will displace on an average of 10 tons of coal each, which will amount to approximately 200,000 net tons; and figured at a freight rate of $2.75 per net ton means a loss of over $500,000 annually.

At the present time we can see no relief in sight, and it is with profound regret that we are forced to announce, effective August 1st, a curtailment in our forces of 35 per cent.

Please acknowledge receipt.

Yours very truly,

HENRIO MIDKIFFE,
President.

THE RAILROAD EMPLOYES AND TAXPAYERS' ASSOCIATION

FIRST NATIONAL BANK BUILDING

Richmond, Va., June 20, 1939.

TO ALL RAILROAD AND EXPRESS EMPLOYEES:

Greetings—

We sincerely trust that the above mock official notice will always remain a dream. However, present indications point to a reality. Some of you may say, what can we do about it? The answer is simple. There is a lot that can be done if we all pull together.

We doubt whether there is a railroad employe in the city of Richmond who does not know a friend or some one who is planning to install oil-burning equipment in their home next winter; and you know that it is a known scientific fact that coal is more economical as a fuel than oil, as it requires 200 gallons of fuel oil to equal one ton of New River or Pocahontas coal in efficiency. *"The oil people admit this fact."*

Please note the following table which shows fuel prices in Richmond at the present time:

This is what you pay when you buy the Best New River Smokeless Coals

One ton New River Double Screened Lump or Egg	$9.50
One ton New River Single Screened Lump or Egg	8.50
One ton New River Lumpy Run of Mine	7.35

This is what you pay when you buy 200 gallons of Oil . . . and bear in mind that 200 gallons of Oil equals one ton of Coal

200 gallons of Oil at $.0625 per gallon	$12.50

EXAMPLE

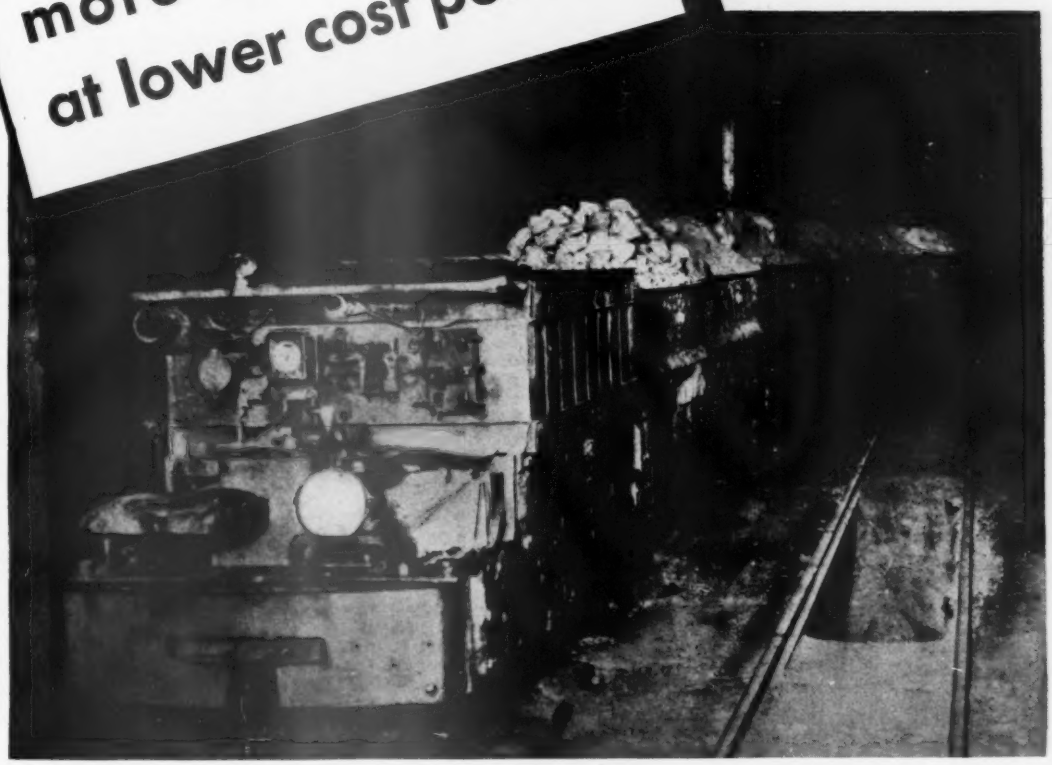
Cost of 200 gallons of Oil equaling one ton Coal	$12.50
Cost of one ton New River Double Screened Lump or Egg	9.50
Savings per ton	$ 3.00 or 24% savings over oil
Cost of 200 gallons of Oil equaling one ton Coal	$12.50
Cost of one ton New River Single Screened Lump or Egg	8.50
Savings per ton	$ 4.00 or 32% savings over oil
Cost of 200 gallons of Oil equaling one ton Coal	$12.50
Cost of one ton New River Lumpy Run of Mine	7.35
Savings per ton	$ 5.15, or 41.2% savings over oil

Kindly quote these figures to any one who is contemplating adopting the far more expensive way of heating with oil. By so doing you may help curb the fast declining coal freight revenues. *Remember, every ton of coal taken away from your railroad means a loss of $2.75, which is costing the coal carrying railroads over half a million dollars annually IN RICHMOND ALONE.*

Faithfully yours,

ARCHER A. PAGE, President.

For more tons per day at lower cost per ton



One of the Exide-Ironclad equipped locomotives hauling train of cars on the Kellogg level at the famous Bunker-Hill Mine.

. . . . USE EXIDE-IRONCLADS

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With their high power ability, these batteries can handle heavy loads on steep grades with ease. The consistently good voltage they maintain insures good haulage speeds. Their ease and low cost of maintenance, plus their long, trouble-free life, mean substantial economies year in and year out.

These are some of the reasons why there are more Exide-Ironclads in underground haulage service than all other makes of batteries combined. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

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Exide Batteries of Canada, Limited, Toronto

Visit Exide exhibit, Space 101, Metal Mining Convention and Exposition, Salt Lake City, Utah

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Results of Unusual Method for Drainage in Shaft Sinking

A unique plan to drain out ground in shaft sinking by the Standard Silver-Lead Mining Company at its Jay Gould mine near Wilborn, Mont., was described briefly on page 64 of the March, 1938, Mining Congress Journal.

Actual results of the plan did not fulfill expectations; but in the belief that experiences encountered may be of value to other operators, the following account from S. R. Moore, manager of the company, is given.

"The drainage project at the Jay Gould shaft was not 100 percent successful, owing largely to the fact that the two holes could not be connected adequately at the bottom.

"The scheme involved drilling two 10-in. holes 200 ft. deep, one just outside the confines of the shaft. A 450-gal. turbine pump was placed at the top of this hole. The other, the drainage hole, was drilled with a slight inclination from the vertical (2 degrees approximately), in order that the two holes be as nearly together as possible at the bottom to affect a connection, and was kept within the confines of the shaft (see Fig. 1).

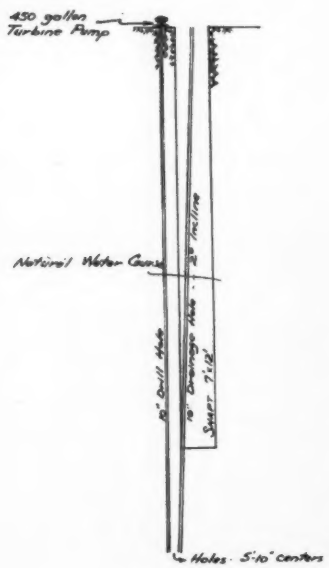

Fig. 1

"Blasting 40 qts. of nitroglycerine, 15 cases of 100 percent powder and 5 cases of 60 percent powder failed to make the connection. Work was in charge of an expert blaster, and 20 ft. of sand tamping was used. The holes were calipered after each blast, and finally were found to be caving so badly that further blasting could not be risked.

"There was a natural water course connection between the two holes 93 ft. from the surface. Down to this connection the scheme worked perfectly. Below this point the water, running between 400 and 500 gal. per minute, had to be fought. It would rise nearly a foot per minute in the 7 ft. x 12 ft. shaft, and the 450-gal pump, transferred from the drill hole to the shaft location, had to have assistance.

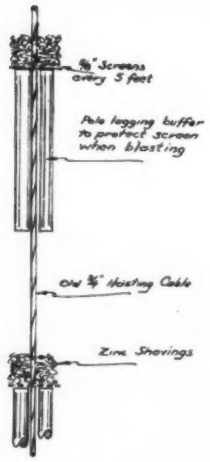

Fig. 2

"The arrangement for screening the water in the drainage hole worked well. We inserted an old ¾-in. cable to which was clamped every 5 ft. a screen with ⅝-in. perforations. On top of each screen we put about 6 in. of zinc shavings for screening the fines. Below each screen a buffer made out of pole lagging was placed, in order to take the shock from blasting (see Fig. 2). Each round, therefore, had a clean screen, and no trouble was encountered from choking.

"If anyone wishes to try this scheme and can drill the holes so as to connect at the bottom, I can highly recommend it."

Madeira Opposes Hydro Projects

At least 5,000 anthracite miners will join the 60,000 already unemployed in the Pennsylvania anthracite region if the proposed Federal hydroelectric projects are put in operation on the Delaware River between Easton, Pa., and Port Jervis, N. Y., according to Louis C. Madeira III, executive director, Anthracite Institute, in a statement made at a hearing July 12 before the United States Army engineers at the Custom House in Philadelphia.

In substance, Mr. Madeira further stated that an investigation of the existing installed capacity of steam-electric generating plants in the area likely to be affected by the Federal projects shows that it is already considerably in excess of current needs or anticipated power requirements for some time in the future. In much of this installed generating capacity anthracite is used exclusively.

The anthracite industry is, therefore, unalterably opposed to these projects because of the very serious social and economic situations which they would create and which when added to existing conditions in the industry might well be considered the last straw.

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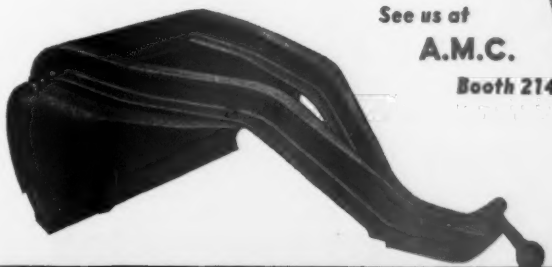

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Winners in National Safety Competition

Notable records achieved by mines and quarries in the prevention of accidents among mineral workers were recognized in the announcement of the winners in the National Safety Competition of 1938 made recently by Dr. John W. Finch, Director, Bureau of Mines, Department of the Interior.

Three hundred and forty-five mines and quarries operating in 37 States participated in this, the fourteenth, annual safety contest conducted by the Bureau of Mines.

Four underground mines, one open-cut mine and one quarry, each a leader in its group, were awarded the "Sentinels of Safety" trophies, donated by the *Explosives Engineer* magazine. Relative standing in the contest was based on the number of days lost from accidents in proportion to the total number of man-hours worked.

Three bituminous-coal mines, 12 nonmetal mines, 4 metal mines, 78 quarries and 16 open-cut mines were operated during the contest year without a lost-time injury to any of the employes.

The six groups comprising the contest were: Anthracite mines, bituminous-coal mines, metal mines, nonmetallic-mineral mines, open-cut mines and quarries.

The trophy for anthracite mines was won by the Greenough mine near Natalie in Northumberland County, Pa. This mine was operated by the Colonial Colliery Company. During a period of 223 days in 1938 the mine worked 319,035 man-hours with 11 lost-time accidents causing 285 days of disability. The accident-severity rate was 0.893.

In the bituminous-coal group, the trophy was awarded to the "B" mine of the Union Pacific Coal Company near Superior, Sweetwater County, Wyo. During the year 1938 it worked 243,094 man-hours without a lost-time accident. This record was made by 189 employes working 246 days.

The Cary iron-ore mine of the Odanah Iron Company near Hurley, Iron County, Wis., was awarded the metal mine trophy for working 168,703 man-hours in 316 days without a lost-time accident.

The winner of the trophy in the nonmetallic mineral mine group was the Avery salt mine of the Avery Salt Company at Avery Island, Iberia Parish, La. This mine worked 272,766 man-hours in 310 days without a lost-time accident.

The trophy for the group of open-cut mines was awarded to the Mahoning iron-ore mine of Pickands, Mather & Company near Hibbing in St. Louis County, Minn. This mine was operated 282,258 man-hours in 1938 without a lost-time accident.

Certificates of Honorable Mention were given to the following mines that were operated during the year without a lost-time accident or whose accident-severity rates ranked second, third, fourth, or fifth in their respective groups.

Anthracite Group

Eddy Creek (Birdseye) mine, Throop, Pa., operated by the Hudson Coal Company.

Jeddo No. 7 mine, Harleigh, Pa., operated by the Jeddo-Highland Coal Company.

Eddy Creek (Shaft) mine, Olyphant, Pa., operated by the Hudson Coal Company.

Midvalley mine, Wilburton, Pa., operated by the Hazle Brook Coal Company.

Bituminous-Coal Mines

D. O. Clark mine, Superior, Wyo., operated by the Union Pacific Coal Company.

Rockhill No. 7 mine, Robertsdale, Pa., operated by the Rockhill Coal & Iron Company.

Samoset mine, Dora, Ala., operated by the Alabama By-Products Corporation.

Hanna No. 4 mine, Hanna, Wyo., operated by the Union Pacific Coal Company.

Metal Mines

West Valcan iron-ore mine, Norway, Mich., operated by the Penn Iron Mining Company.

James iron-ore mine, Iron River, Mich., operated by the James Mining Company.

Forbes iron-ore mine, Iron River, Mich., operated by the North Range Mining Company.

Alexandria iron-ore mine, Chisholm, Minn., operated by the Republic Steel Corporation.

Open-Cut Mines

(All of these mines were operated during 1938 without a lost-time accident.)

Scranton iron-ore mine, Hibbing, Minn., operated by the Pickands, Mather & Company.

Danube iron-ore mine, Bovey, Minn., operated by the Pickands, Mather & Company.

Plymouth iron-ore mine, Wakefield, Mich., operated by the Plymouth Mining Company.

Wakefield iron-ore mine, Wakefield, Mich., operated by the Wakefield Iron Company.

Bennett iron-ore mine, Keewatin, Minn., operated by the Pickands, Mather & Company.

Sagamore iron-ore mine, Ironton, Minn., operated by the Pickands, Mather & Company.

Mahomen iron-ore mine, Ironton, Minn., operated by the Pickands, Mather & Company.

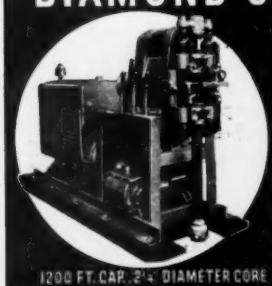
Albany iron-ore mine, Hibbing, Minn., operated by the Pickands, Mather & Company.

Corsica iron-ore mine, Elcor, Minn., operated by the Pickands, Mather & Company.

Biwabik iron-ore mine, Biwabik, Minn., operated by the Pickands, Mather & Company.

Susquehanna iron-ore mine, Hibbing, Minn., operated by the Republic Steel Corporation.

DIAMOND CORE DRILLING
CONTRACTORS



TESTING COAL AND ALL MINERAL PROPERTIES - USING OUR LIGHT GASOLINE DRILLS.. THEY SAVE FUEL AND MOVING COSTS..WE GUARANTEE SATISFACTORY AND PROPER CORES..

PRE-PRESSURE GROUTING FOR MINE SHAFTS... GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD. WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED... ELECTRIC DRILLS FOR INSIDE MINE DRILLING..

1200 FT. CAP. 2¼ DIAMETER CORE

MOTT CORE DRILLING CO.
HUNTINGTON, W. VA.

ROBINSON
VENTILATING COMPANY
•
Fans and Blowers
Ventilating Engineering Service
•
ZELIENOPLE
PENNSYLVANIA

O. C. Hoffman, *Pres.* *Established 1902* L. H. Hoffman, *Treas.*
HOFFMAN BROS. DRILLING CO.
CONTRACTORS
DIAMOND CORE DRILLING
PUNXSUTAWNEY, PA.
Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed

A PROPOSED INSULATED TROLLEY WIRE

By M. W. HORGAN
Mining Engineer
Monongahela West Penn
Public Service Company

The accompanying photograph shows a model of an insulated trolley wire designed for mine use. I am submitting this to the mining industry without expecting any remuneration, but in the belief that the use of this idea would save many lives underground.

I have assurance that this section can be manufactured in the same manner that heavy trolley wire is now made, and it is my thought that, for underground use, short lengths could be taken into the mine and spot welded in place. Following are some of the advantages over uninsulated trolley wire.

1—A man can put his hand completely around the section without touching live copper.

2—A man can touch the section even at the bottom with any part of his body without touching live copper.

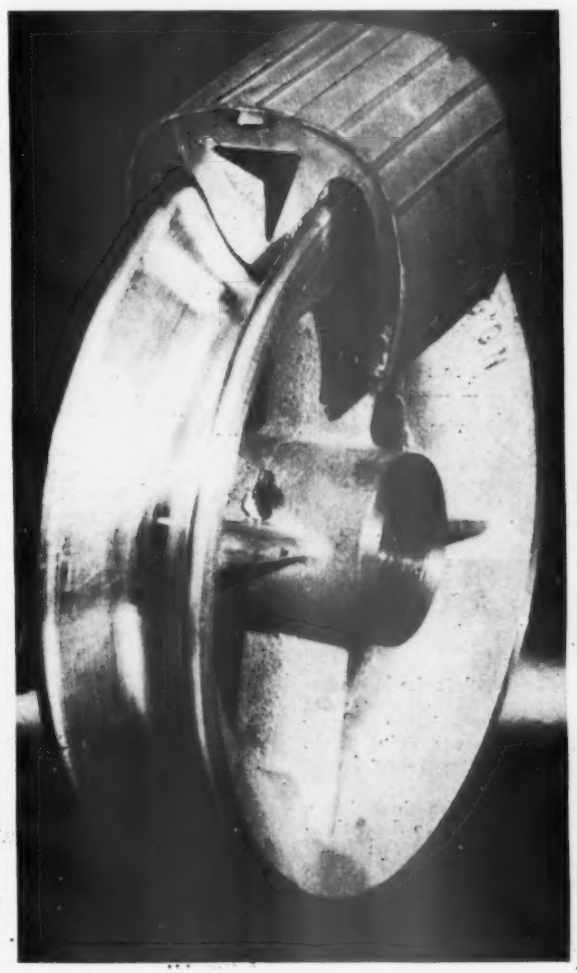
3—The protective covering is of hard rubber or plastic which snaps over the bare copper after installation and need not be put on except in dangerous places where it replaces guard boards.

4—In case of a roof fall taking down this section, the rubber cover would no doubt prevent an arc to rail and lessen the danger of mine fires.

5—The section shown is roughly 2,000,000 c.m. and does away with feeder tie-ins and feeder hanging, in addition to the hang of the trolley wire.

6—The model shows a much improved surface contact to the trolley wheel or slider than can be had with round trolley wire.

7—For outside work sleet cannot form on the copper because of the protective covering.



PUBLICATIONS of INTEREST

U. S. BUREAU OF MINES

ECONOMIC PAPER 16. THE IRON AND STEEL INDUSTRIES OF EUROPE, by Charles Will Wright. 98 pp. 1 fig.

TECHNICAL PAPER 8. METHODS OF ANALYZING COAL AND COKE, by F. M. Stanton, A. C. Fieldner and W. A. Selvig. 59 pp. 17 figs.

TECHNICAL PAPER 590. ANALYSES OF PENNSYLVANIA COALS, by Geo. H. Ashley. 503 pp. 5 figs.

T. P. 594. CARBONIZING PROPERTIES AND PETROGRAPHIC COMPOSITION OF PITTSBURGH-BED COAL FROM BUREAU OF MINES EXPERIMENTAL MINE BRUCETON, ALLEGHENY COUNTY, PA., by A. C. Fieldner, J. D. Davis, R. E. Brewer, W. A. Selvig, D. A. Reynolds and G. C. Sprunk. 43 pp. 26 figs. 10 cents.

TECHNICAL PAPER 595. CARBONIZING PROPERTIES AND PETROGRAPHIC COMPOSITION OF WASHED AND UNWASHED LOWER AND UPPER KITTANNING BED COALS FROM MINES 72 AND 73, JOHNSTOWN, CAMBRIA COUNTY, PA., by A. C. Fieldner, J. D. Davis, R. Thiessen, W. A. Selvig, D. A. Reynolds and C. R. Holmes. 83 pp. 53 figs.

I. C. 7063. COAL-MINE MECHANIZATION AND ACCIDENT-FREQUENCY RATES OF HAND AND MECHANICAL LOADING IN ILLINOIS, by A. U. Miller. 31 pp.

I. C. 7067. MULTIPLE-SHIFT MECHANICAL MINING IN SOME BITUMINOUS COAL MINES, PROGRESS REPORT 2, by Albert L. Toenges and Frank A. Jones. 28 pp. 14 figs.

I. C. 7068. REQUIREMENTS FOR VENTILATION—ALABAMA MINING LAW, by Frank E. Cash. 4 pp. 1 fig.

I. C. 7069. TIN DEPOSITS OF THE BLACK HILLS, SOUTH DAKOTA, by E. D. Gardner. 78 pp. 7 figs.

R. I. 3452. STUDIES OF ROOF MOVEMENT IN COAL MINES. 2. CRUCIBLE MINE OF THE CRUCIBLE FUEL CO., by E. R. Maize and H. P. Greenwald. 19 pp. 23 figs.

MISCELLANEOUS

CALIFORNIA JOURNAL OF MINES AND GEOLOGY. October, 1938. Quarterly Chapter of State Mineralogist's Report, XXXIV, State Division of Mines. 669 pp.

PROBLEMS AND TRENDS IN THE MINERAL INDUSTRIES OF PENNSYLVANIA, by W. M. Myers. Pennsylvania State College Bulletin 17. 77 pp. 24 figs. 50 cents.

CAMBRIAN FORMATIONS OF THE EUREKA AND PIOCHE DISTRICTS, NEVADA, by Harry E. Wheeler and Dwight M. Lemmon. Geology and Mining Series No. 31. University of Nevada Bulletin No. 3. 60 pp. 11 figs. 25 cents.

PETER F. LOFTUS
Consulting Engineers
ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY
Oliver Building Pittsburgh, Pa.

PERSONALS

Robert Gregg, president, and **C. E. Abbott**, vice president in charge of raw materials, of the Tennessee Coal, Iron and Railroad Company; **Benjamin F. Harris**, president of the National Tube Company; and **C. H. Rhodes**, vice president in charge of purchases for the United States Steel Corporation of Delaware, recently visited the iron mines of the Oliver Iron Mining Company on the Mesabi and Vermillion Ranges. They were joined in Duluth by **Leroy Salsich**, president, and **A. Y. Peterson**, vice president, of the Oliver Iron Mining Company.

Dr. Warren J. Mead, chairman of the Geology Department at Massachusetts Institute of Technology, is spending the summer in Alaska, where he is engaged in professional work for the U. S. Smelting, Refining and Mining Company.

T. H. O'Brien, vice president and general manager of Inspiration Consolidated Copper Co., recently returned from a trip to the Orient, during which he visited Japan and China.

William L. Doolittle, mechanical superintendent in charge of construction, mechanical and electrical engineering departments of the Consolidation Coal Company, has been appointed chief engineer, with headquarters at Fairmont, W. Va.

H. J. Gentry has been named supervisor of mine inspectors in the State Department of Industrial Relations in Alabama, a position just recently created. Mr. Gentry was formerly mine inspector of the department. **Otis H. Youngblood** and **Monroe S. Bailey** have been appointed mine inspectors.

William Taylor, formerly executive vice president of the Valley Camp Coal Company and its various subsidiary companies, and **Alex Grant**, formerly manager of Kelly's Creek Collieries Maiden mine at Maidsville, W. Va., one of the Valley Camp Coal Company subsidiaries, have resigned from the Valley Camp interests and have organized Coal Mine Management, Inc., to manage and operate bituminous coal mines. They have already taken over the management of the Rocky Mountain Fuel Company properties in Colorado, and are negotiating for operation of mines in the eastern fields. William Taylor is president of the organization, and Alex Grant, vice president, and offices are maintained in the Guardian Building, Cleveland, Ohio, and in the Flatiron Building, Denver, Colo.

Fred Denig, vice president of Koppers Company Engineering and Construction Division, has been appointed to the newly created post of director of research and development for all companies and divisions of the Koppers group of companies.

Dr. Nels. P. Peterson was recently elected assistant professor of mining and metallurgy at the New Mexico School of Mines, and geologist for the New Mexico Bureau of Mines and Mineral Resources.

A. B. Hall, manager of the metal department of the National Lead Company, was tendered a testimonial dinner by some 100 members of the metal trade and related lines on June 27 at the Biltmore Hotel, in New York. The affair was sponsored by the American Tin Trade Association, of which Mr. Hall is president, in celebration of Mr. Hall's having completed 50 years with the National Lead Company and in recognition of his long service with the metal trade.

C. S. J. Trench, vice president of the American Tin Trade Association, presided as toastmaster, and brief addresses of felicitation were made by **Charles Slaughter**, president of the Commodity Exchange; **Fletcher W. Rockwell**, president of National Lead Company; **John Hughes**, formerly assistant to the president, United States Steel Corporation; and **Edwin Groves**, of J. W. Phyfe and Company.

P. R. Paulick has left the Princeton Mining Company and is now chief engineer for the Powhatan Mining Company, at Powhatan Point, Ohio. He started his new work July 1.

Donald W. Scott, research engineer, has recently been added to the technical staff of Battelle Memorial Institute. He has been assigned to the concentration division, which works on developing and improving concentration methods and equipment for ores, coals and other industrial materials.

Louis S. Cates, president, and **H. M. Lavender**, general manager of metal mines, of the Phelps Dodge Corporation, were visitors on the Mesabi Iron Range late in June. **Earl E. Hunner**, general manager of The M. A. Hanna Company, accompanied them on their tour of inspection of several of the large open-pit mines on the range.

—*Obituaries*—

Walter H. Eardley, manager of smelters and mills of the Utah district for the U. S. Smelting, Refining and Mining Company, died June 19 in Salt Lake City, following a long illness.

Mr. Eardley entered the employ of the U. S. Smelting Company in 1905, and was transferred in 1914 to New York City as general manager of the company's zinc operations.

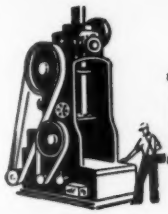
Four years later he became district manager of the Joplin, Mo., field for the American Metal Company of New York, and two years later opened offices in New York City as a consulting engineer. In 1922 he returned to Salt Lake City to assume the position he held until the time of his death.

William H. Gallagher, Jr., chief mining and electrical engineer of Pickands, Mather and Company, died in Saginaw, Mich., July 1, while on vacation, accompanied by his family. His age was 57.

Mark H. Newman, geologist for the American Zinc, Lead and Smelting Company, died in Mascot, Tenn., July 12, at the age of 60.

Fred Hodges, superintendent of Nevada Consolidated Copper Corporation's plant at Hurley, N. Mex., died June 11 at Phoenix, Ariz. Mr. Hodges was a native of Salt Lake City, and was prominent in mining circles throughout the West and Alaska.

Charles F. Richardson, president of the West Kentucky Coal Company, died in St. Louis, Mo., July 17. His age was 77.



MANUFACTURERS' Forum

Coal Used In Manufacture of Miners' Safety Caps

An interesting sidelight on the construction of the M.S.A. Comfo Cap, as recently pointed out by an official of Mine Safety Appliances Company, is that "Comfo" wearers can have the satisfaction of knowing that the coal they mine may be used in the manufacture of their protective headgear.

"By-products of coal are employed in the making of bakelite, from which these caps are molded," the executive explained, "and so, in a sense, these men mine their own caps! The coal-derived bakelite is noted, among other features, for its high fracture-resisting strength, immunity to softening from exposure to mine water, oil or perspiration, and non-conductivity to electricity. The light gauge material provides excellent wearing comfort, yet has remarkable ability to resist impact of blows from falling roof, coal, flying objects, and other hazards.

"When you consider," he concluded, "that statistics prove that over 50 percent of all mine fatalities are due to roof falls, the importance of Comfo Cap's unusual protective qualities is readily apparent."

Descriptive bulletins on the M.S.A. Comfo Cap for coal miners may be obtained from this publication, or by writing direct to Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

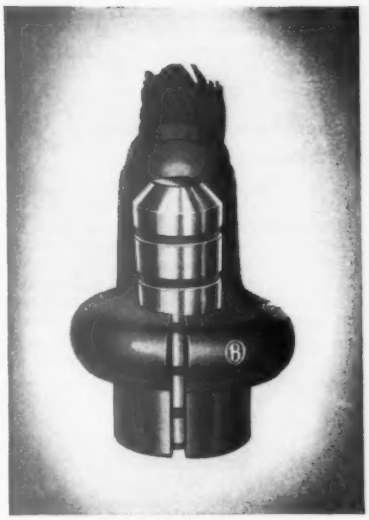
Illustrated are miners wearing the M.S.A. Comfo Cap, which is manufactured in part with coal by-products.

Interlocking Cable Junction and Split Terminal Rail Bond

The Ohio Brass Company, Mansfield, Ohio, announces development of a new Type B interlocking junction for making d.c. trailing cable connections with the power off. This protective, non-gasproof device is completely enclosed in a steel case. A quick-break switch is interlocked with the case so that the case cannot be opened and connections cannot be made with the power on. Fuse protection is provided for each of the three machine circuits which the junction accommodates.

Provision for a ground circuit is included so that the entire device may be grounded for additional protection.

Trailing cables from machines are clamped in molded rubber hand grips. Each of the three hand grips has three split phosphor bronze plugs so arranged that the plugs cannot be inserted in the wrong machine circuit. One plug makes contact with the positive line, one with the negative line and one with the ground circuit.



Mounted on a moisture-proof insulating panel, the entire device is completely enclosed in a steel, non-gasproof case.

Also announced by Ohio Brass is development of a new rail bond designed for bonding around joint plates and for cross bonding. This bond, designated as the Type ETP bond, is of standard stud terminal design, except that the terminal is slotted and drilled to permit insertion of a tapered steel pin. The terminal is placed into a hole of proper size in the web of the rail. The tapered steel pin is then driven into the hole in the terminal resulting in a powerful expanding force. Great installation permanency is achieved by this design, according to the company. At the same time the bond may be easily reclaimed by driving the tapered steel pin out of the terminal from the other side of the rail.

Terminals are of copper with sleeve construction around the strand to dampen vibration and prolong bond life. The tapered steel pin is ribbed to provide a positive lock when driven into the terminal (see cut above).

Torque Motor Operated Brake

A new torque motor operated brake for alternating current service on elevators, cranes, hoists, and similar installations is announced by Cutler-Hammer, Inc., 408 North 12th Street, Milwaukee, Wis. This new brake is designed especially for those applications where positive, quick, "cushioned" braking is required for stopping or holding a load.

A sturdy, dependable torque motor, operating through a simple anti-friction ball jack, releases the brake. When the brake is fully released, the torque motor is stalled across the line. When the circuit is opened, the heavy, helical torque spring sets the brake. A slight flywheel action of the rotor provides smooth, cushioned braking.

This new brake is available in five sizes, providing maximum torque ratings of 160, 400, 800, 1,600 and 3,200 lbs. ft. on intermittent duty. Continuous duty ratings are slightly lower. Available for all commercial frequencies and voltages.

Descriptive Bulletin 508 will be sent on request.

Mine Bit Forging Machine

A new machine that forges mine bits of unvarying uniformity at a greatly increased rate of speed, has been introduced by L. M. Brown, Inc., 110 East 7th Avenue, Homestead, Pa., and was displayed at the sixteenth annual Coal Show in Cincinnati last April.

Known as the "Super" Mine Bit Forging Machine, it will forge high alloy steels, such as "Super" Cesco Diamond Steel, that are too tough to forge by hand or by other machines. Bits made of this steel are so hard they will cut from four to eight times as many lineal feet of coal per dressing as carbon steel (depending on location of mine) and may be redressed from 120 to 140 times without loss of efficiency. They are extremely tough, resulting in minimized breakage and lessened tendency to bend. Retention of sharp cutting edge, plus absolute uniformity of bit when forged by the new machine, greatly

V 25 I 8 AUG 39

increases the efficiency of cutting machines, which in turn reduces power consumption from 18 percent to 30 percent, according to the manufacturer.

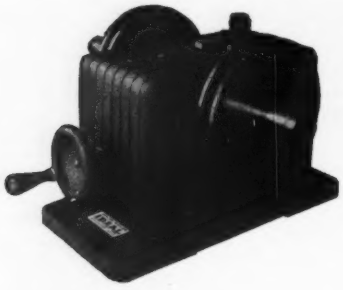
Goodman Purchases Shovel Company and Conway Patents

Effective July 12, 1939, the Goodman Manufacturing Company purchased the business and good will of the St. Louis Power Shovel Company in the United States, Canada and Mexico. At the same time a contract was completed with the National Lead Company for the purchase of patents on Conway Shovels heretofore owned by the National Lead Company.

The Goodman Manufacturing Company will thus exclusively carry on the business in Conway Shovels in the United States, Canada and Mexico.

Armature Balancing Ways

The Ideal Commutator Dresser Co., 1963 Park Avenue, Sycamore, Ill., has just introduced a compact, handy unit for the static balancing of motor armatures. A thorough job is done quickly and inexpensively, as no level-



ing or setting-up time is required—just place the Ways on the floor or bench, and they are ready for use. No centers required for balancing, as free turning semi-steel discs mounted on precision ball bearings, carry the armature.

The standards which support the revolving discs are adjustable to take any size armature within the limits of the machine. Following are the three standard units available: 10-in. swing, capacity 300 pounds; 20-in. swing, capacity 1,000 pounds; 42-in. swing, capacity 1,000 pounds. These are available in many shaft lengths.

Barber-Greene Reorganizes Sales Department

Barber-Greene Company of Aurora, Ill., announces the reorganization of the Sales Department. B. E. Lindstrom, who for many years has been manager of the Chicago office, has been made district manager in charge of the central states.

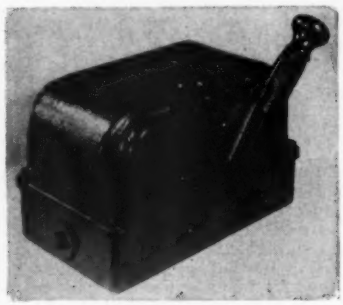
E. H. Cooper is now district manager of the southwestern states and E. L. Benson, who has been in charge of bituminous paving promotion, is now district manager of the northwestern states.

W. B. Holder continues as eastern manager with the territory expanded to include New York, Pennsylvania, Maryland and the states east and north of these.

Barber-Greene manufactures portable and permanent belt conveyors, bucket loaders, bituminous mixers and finishers, snow loaders, coal handlers and ditchers.

Master Switch and De-Ion Combination Linestarter

A new type of heavy-duty master switch, for mill and crane controllers, has recently been announced by the Westinghouse Electric & Manufacturing Company. This master switch for a.c. or d.c. control circuits is designed for service on cranes, hoists, bridges, roll and transfer tables, coke pushers and similar applications where easy



and positive operation and long life are essential.

Positive operation results from the cam-opened spring-closed arrangement which eliminates any possibility of contacts remaining closed on a point where they should be open. The switches are easy to operate, with star wheel and two pawls, one for the "off" position and one for the various points, giving a definite "feel" of the operating points. Weatherproof construction is maintained by use of cast-iron base and cover with wide flanges. Accessibility for inspection and wiring results from the use of shallow base and deep cover, and group mounting is facilitated by a cover which can be removed vertically.

MINE ROOF JACK

This latest development of the Duff-Norton Mfg. Co., Pittsburgh, Pa., has proved to be a great time and labor-saving device—assuring maximum safety in mechanical mining practice. The conveniently located slide handle not only permits easy operation in cramped quarters but also provides a greater leverage. The variety of tops available make this jack adaptable to any mine roof requirement

We Look Into the Earth

By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.

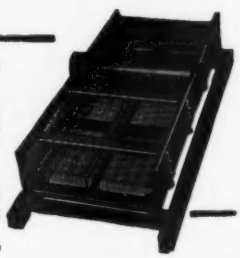
Pennsylvania Drilling Co.
Pittsburgh, Pa.
Drilling Contractors

FOR GREATER PROFITS IN 1939, GET A UNIVERSAL VIBRATOR!

Here's a simple, reliable machine that will operate without attention while turning out a thoroughly screened product of finest quality.

Catalog on request.

UNIVERSAL VIBRATING SCREEN CO.
RACINE ~ ~ WISCONSIN



The switches are provided for either hand or foot operation, and for vertical or horizontal mounting.

Also announced by Westinghouse is a new De-ion combination linestarter, consisting of a magnetically operated linestarter and a manually operated motor circuit switch combined in the same streamlined cabinet. It is especially designed for across-the-line

starting of squirrel cage motors, or as primary switch for wound-rotor induction motors.

Outstanding new feature of the linestarter is the safe-locking design of handle and cabinet. With the insertion of one padlock the unit can be locked in off position and the door locked shut. Heretofore all starters have required two padlocks to provide this safety. To make it more safe, the door cannot be opened with the switch in "on" position.

The starter has fuseless circuit protection by an instantaneous magnetic trip circuit breaker. There are no elements to renew after circuit tripping. Breaker is reset by moving external handle. The breaker handle is a positive indicator, showing whether breaker is "on," "off," or "tripped."

Additional information may be obtained from department 7-N-20, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Lightweight Portable Compressors

The Sullivan Machinery Company, Michigan City, Ind., makers of a large line of air compressors, announce the addition of a completely new line of portable air compressors known as the "ZEPH-AIR."

The new line features compact construction, self starters and refinement of other details to provide extreme mobility and ease of operation.

Two sizes are available with capacities of 60 and 85 cubic feet per minute, respectively, of delivered air. Although these compressors have capacity to operate concrete breakers and rock drills, they are so small and compact that the two-wheel mountings can be towed by a pleasure car and the skid-mounted models can be mounted in the body of standard pick-up trucks.

Bulletin A-24, describing the "ZEPH-AIR," can be obtained direct from the manufacturer, the branch office, or from any of the company's many distributors.

Speedframe for Goggles

Time saved for the worker—production increased for management—these welcome values are provided by the new M.S.A. Speedframe, pictured and described in a recent bulletin published by the Mine Safety Appliances Company.

The Speedframe consists of suitable goggles mounted in a lightweight, comfortable fiber headframe, so designed that a simple nod of the head positions the goggles in front of the eyes or a nod will throw them up and

out of the way. The goggles remain in either position without further adjustment, assuring uninterrupted use of both hands.

The assembly is fully adjustable, and holds the goggles, when lowered, properly and comfortably in place. Write for your copy of M.S.A. Speedframe Bulletin No. CE-7 to this publication, or direct to Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

CATALOGS AND BULLETINS

• BIT DRESSING EQUIPMENT. *Ingersoll-Rand Co.*, Phillipsburg, N. J. Form 2579 describes company's jackmills for redressing jackbits. 4 pages.

• CABLE. *Anaconda Wire & Cable Co.*, 25 Broadway, New York City. Catalog presents physical and electrical characteristics for all types of company's rubber-insulated power cables, including a complete section on coding details of control cables, as well as a comprehensive section on technical data. 56 pages.

U. S. Rubber Co., 101 Sandusky Street, N. S., Pittsburgh, Pa. Folder M-9390 on U. S. Royal parallel duplex mining machine cable, concentric mining machine cable and splicing kits. 4 pages.

• CAR PULLER. *The Jeffrey Mfg. Co.*, Columbus, Ohio. Folder 712 on company's "all purpose" stream-lined car puller with capacity of two to three cars. 4 pages.

• COAL CUTTING EQUIPMENT. *The Jeffrey Mfg. Co.*, Columbus, Ohio. Catalog 705 is a complete description of company's 29-U, 29-LE, and 29-L track cutting machines. 20 pages.

Catalog 707 features company's complete 35 series shortwall coal cutters, available in six types. 16 pages.

• COAL PREPARATION EQUIPMENT. *Deister Concentrator Co.*, Ft. Wayne, Ind. Pamphlet on Concenco water spray-nozzles. 2 pages.

The Jeffrey Mfg. Co., Columbus, Ohio. Catalog 701 describes company's diaphragm jigs and unit washeries. 20 pages.

• DUST DETERMINATION. *Mine Safety Appliances Co.*, Pittsburgh, Pa. Bulletin CT-2 on midget impinger and dust-counting microscope. 2 pages.

Bulletin CT-3 on company's electrostatic dust and fume samples. 1 page.

Bulletin CT-4 on microprojector as a new aid in modern dust determination. 1 page.

• FILTERS. *The Eimco Corporation*, Salt Lake City, Utah. Bulletin 402 on company's continuous vacuum filters for the mining industry, including drum- and disc-type filters, together with auxiliary equipment used with them. 28 pages.

• GENERAL CATALOG. *Link-Belt Co.*, 307 North Michigan Avenue, Chicago, Ill. General catalog No. 800 is the largest and most comprehensive catalog the company has ever issued, containing list prices, dimensions, weights and engineering data on power transmission machinery, and on equipment for handling, screening, drying, cooling and preparing materials mechanically. A 44-page pictorial section in the fore part of the book is devoted to giving the recipient a bird's-eye view of the many products that the company makes. 1278 pages.

• MATERIALS HANDLING EQUIPMENT. *The Jeffrey Mfg. Co.*, Columbus, Ohio. Bulletin 709 describes company's complete line of Jeffrey-Traylor all-electric vibrating units used in feeding, conveying, screening, barrel-packing, cooling, drying and other processes. Balanced high-frequency vibration under absolute control features this line of equipment. 8 pages.

• MOTORS. *Westinghouse Elec. & Mfg. Co.*, East Pittsburgh, Pa. Booklet 2164 describes proper selection and advantages of synchronous motors in simple language that the layman can understand. 12 pages.

• PORTABLE COMPRESSORS. *Ingersoll-Rand Co.*, 11 Broadway, New York City. Form 3364 describes specifications and applications of the company's new line of two-stage air-cooled portable compressors. Gasoline-engine-driven and type "H" oil-engine-driven models are described, and a wide variety of mountings available are illustrated. 32 pages.

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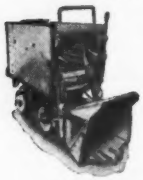

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